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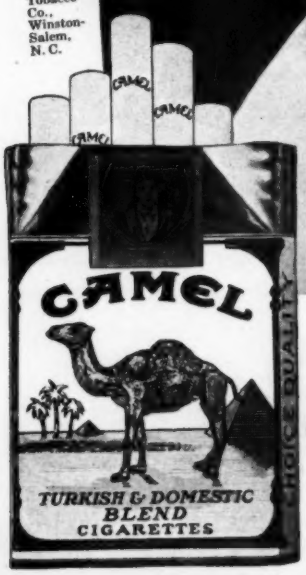

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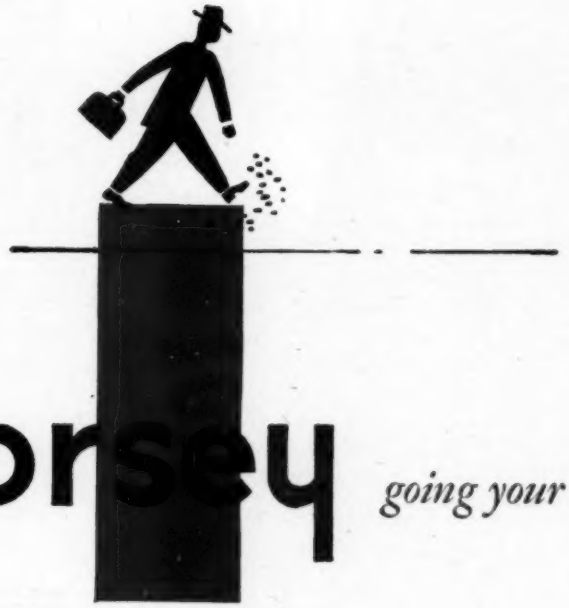

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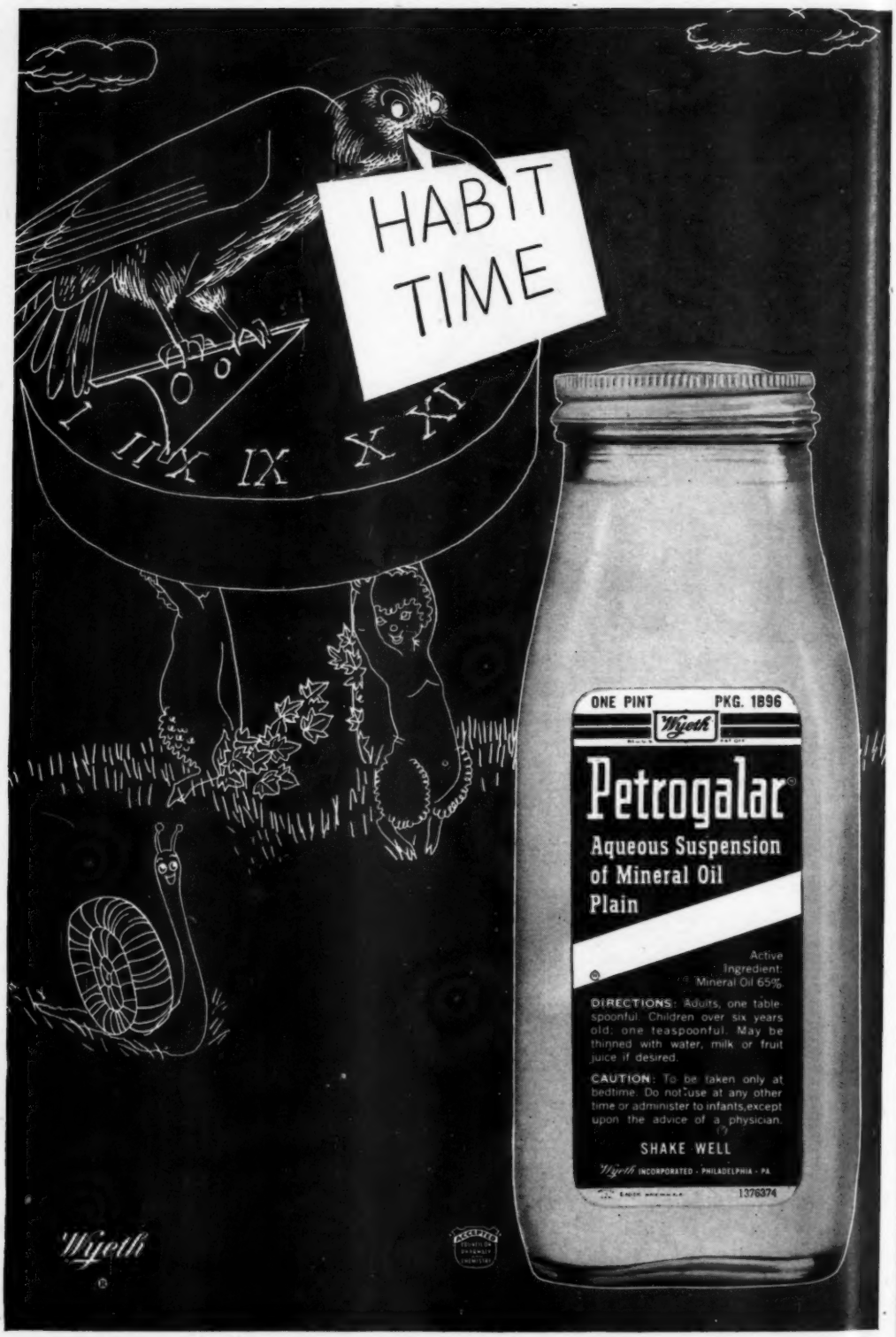
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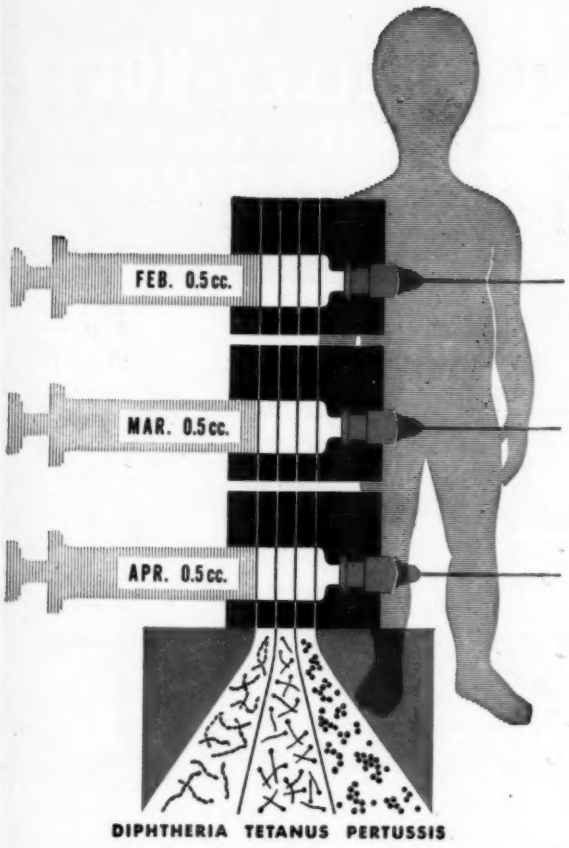

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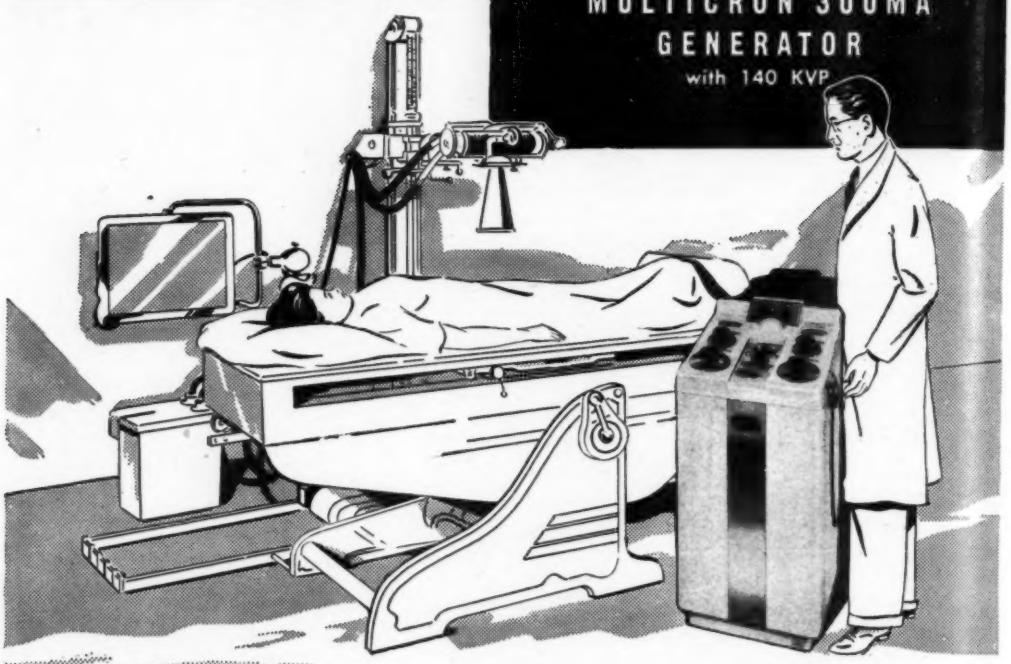

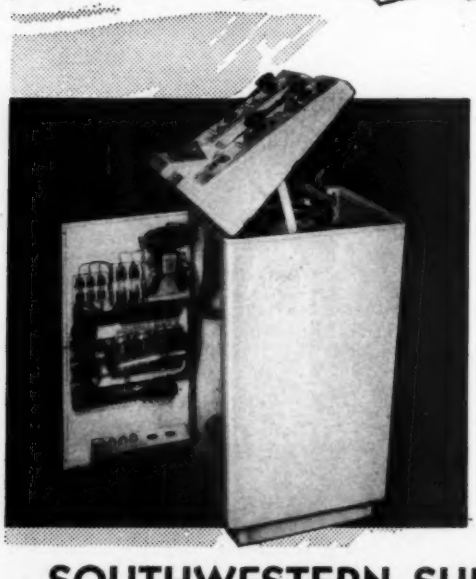

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ARIZONA MEDICINE

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THE SYSTEMIC EFFECTS OF UNTREATED BOWEL OBSTRUCTION

W. D. GATCH, M. D.
Indianapolis, Indiana

SIMPLE OBSTRUCTION is obstruction without gangrene of the bowel. STRANGULATION OBSTRUCTION is obstruction with gangrene of the bowel. The systemic effects of these and briefly the effects of the two forms of paralytic obstruction, the functional form and the form due to peritonitis will be considered. Obstruction of the duodenum and jejunum is high; of the ileum, intermediate; and of the colon, low. High, untreated obstruction, causes violent symptoms and death in 2 to 4 days. Low, untreated obstruction, causes mild symptoms which may not be ended by death for three or four weeks. The course of intermediate obstruction is midway between these extremes.

Within the last hundred years three theories have been advanced to explain the systemic effects of bowel obstruction. These are:

1. The Neurogenic theory. This assumes that afferent impulses in the nerves of the obstructed bowel cause the effects.

2. The Theory of Intoxication. This assumes that the systemic effects are due to poisons absorbed from the obstructed bowel.

3. The Theory of Deranged Metabolism. This assumes that the effects are due to starvation, anoxia, loss of water, loss of electrolytes, etc.

A great part of the immense literature on obstruction seeks to prove or disprove one or another of these theories. The neurogenic theory is the oldest of the three. Sir Frederick Treves supported it in his book on obstruction published in 1884. To an observer of that day it seemed to give a reasonable explanation of the sequence of events—agonizing pain, vomiting, failure of the circulation, torpor and death—which follow high or intermediate obstruction.

The intoxication theory replaced the neurogenic theory and dominated research on bowel obstruction and its treatment till very recent times. Physicians believed that the contents of obstructed bowel are extremely poisonous; that they are "Greedily" absorbed by normal bowel below the site of an obstruction as soon as this is removed; that the chief object of treatment is to get this dangerous material out of the body as soon as possible. Hence the dictum, "never let the sun set on a bowel obstruction."

The results of numerous animal experiments seemed to justify this firm belief in the intoxication theory. The untreated contents of obstructed bowel, or materials derived from them in one way or another, were injected into the veins of normal animals. These were observed to die with symptoms which resembled those of bowel obstruction. After what now seems a very long time, experimentors realized that the crucial question they must answer was not, are toxins present in obstructed bowel?, but can any toxin be absorbed from obstructed bowel? Such absorption, of clinical importance, by the way of the mesenteric vessels has never been demonstrated by any one of the hundreds of experiments done to answer this question. Transperitoneal absorption can easily be shown to occur, but it can also be shown that the body has a farily good protection against it. It is now known, also, that the contents of obstructed bowel contain no water soluble toxin, because the filtrate from them through ordinary filter paper

Read before the Fifty-eighth Annual Meeting, Arizona Medical Association, Tucson, Arizona, May 11, 1949.

causes no apparent effect when injected into a vein. The filtrate from the contents of normal bowel is intensely toxic when so injected.

Brown and Boratau in 1908 showed that bowel obstruction thickens the blood by taking from it an enormous quantity of water. Hartnell and Hoquet in 1912 discovered that the life of the experimental animal with bowel obstruction can be greatly prolonged by giving it salt solution by vein. These discoveries, however, did not shake the almost universal belief of clinicians in the intoxication theory. The beneficial effects of water were explained by the supposition that it removed toxins. Haden and Orr in 1923 advanced the hypothesis that toxins, absorbed from obstructed bowel, are neutralized by salt. This was of course not true, but the experimental and clinical work undertaken to test its truth called general attention to the fact, discovered years before by Brown and Boratau, that death from high or intermediate obstruction is chiefly due to loss of water and electrolytes. Obstruct the jejunum of a dog and it will die in two or three days. If, however, you save its vomitus and inject this into the bowel below the obstruction it will live indefinitely and in perfect health. This experiment makes it impossible to believe that the bad effects of high obstruction are due to absorption of toxins.

The disproof of the theory of intoxication was of great advantage to abdominal surgery. The death rate of bowel obstruction treated according to the dictates of this theory ranged as high as 80%. It caused the introduction of but one useful treatment of obstruction, enterostomy, and that on the false idea that the beneficial effects of this operation are due to the removal of poisonous material from the bowel.

It is now thought that the systemic effects of bowel obstruction are due to metabolic disturbances. Loss of water and of electrolytes has already been discussed. Distention of the stomach and bowel is another important disturbance.

Clinicians had known the deadly effects of distention of the stomach for a long time. William Mayo declared that an interne should carry a stomach tube instead of a stethoscope around his neck. The mechanism, however, by which bowel distention causes its bad effects was not understood. Gendel and Fine reported in 1939 that distention maintained for many hours causes marked concentration of the blood. In 1940 they reported that they were unable to account for this. The writer and Battersby in 1942 reported the results of an experimental study of this matter. They found:

1. That distention of the small bowel with pressures too low to injure it caused marked cyanosis, hemoconcentration and death.

2. That the same results occurred after removal of the small bowel, when Penrose tubing equal to it in diameter and length and inflated with the same pressure, were confined within the abdomen.

3. That distention of the stomach caused the same effects as distention of the small bowel, but sooner. (Great distention of the stomach caused the death of two dogs in three hours without concentration of the blood.)

4. That autopsies on these dogs showed no abnormalities of any kind except a tarry consistency of the blood. No accumulation of fluid in any tissue, body space, the urinary bladder, or bowel was found.

They stated that "The only explanation of this loss of water from the blood which is conceivable is that it is caused by the escape of blood proteins from capillaries in all parts of the body. This implies that distention of the bowel injures the capillary epithelium of the body and permits the blood proteins to escape."

Analysis of the blood after prolonged distention of the bowel shows that it has lost much more albumin than globulin. This indicated that the damage to the capillary endothelium is not as grave as that caused by burns or inflammation, since after these injuries the large globulin molecules escape as easily as the smaller albumin molecules. Further, it is well established that the experimental animal can recover from the effects of distention of the bowel if this has not been too prolonged. The results of the foregoing experiments make it inconceivable that distention of the bowel causes capillary damage by any neural mechanism or by the action of any toxic material produced in the distended bowel. These considerations led to the hypothesis that the damage to the capillaries was due to slowly developing asphyxia caused by distention of the bowel or stomach.

Gatch and Battersby showed that distention of the small bowel or stomach elevated the diaphragm till the negative intrathoracic pressure was no longer present except when the animal made a very deep inspiration; that under these

conditions proper oxygenation of the blood was impossible. The quantity of air the animal breathed in and out was greatly increased, but a sufficient quantity of it evidently did not reach the pulmonary alveoli. Artificial respiration and the administration of pure oxygen postponed death, but could not prevent it. The administration of adequate quantities of plasma would prevent the hemoconcentration.

Results identical with those caused by bowel distention could be brought about by prolonged and partial obstruction of breathing.

It is now proper to consider the causes of death from bowel obstruction at different levels.

Death from High Obstruction

Death from high obstruction is apparently due to starvation, to loss of water and loss of electrolytes—nearly all sodium and chlorine—by vomiting. The gastric mucosa, the liver and the pancreas pour five to six quarts of fluid into the upper gastro-intestinal tract every twenty-four hours. This is absorbed by the ileum and colon. The extreme dehydration which occurs when this fluid is lost by vomiting is the chief cause of death. The result is the same when it is lost through a duodenal fistula. When the vomitus comes from a stomach secreting hydrochloric acid, more atoms of chlorine than of sodium will be lost, and alkalosis will occur; when most of it comes from below the ampulla of Vater the contrary will happen. When the stomach, in a case of high obstruction is kept empty by vomiting, anoxia will not be present, but when vomiting does not occur, acute dilatation of the stomach may cause anoxia by interfering with breathing.

Death from Low Obstruction

Several times death has been observed from untreated obstruction of the sigmoid by cancer where the immediate cause was rupture of the bowel following a prolonged period of distention and constipation. The clinical picture was astonishing and unforgettable. The presenting symptom in every instance was a sudden agonizing pain. This was quickly followed by board-like rigidity of the abdominal muscles and the signs of peripheral vascular failure. Startling cyanosis appeared in an hour or two. These patients all had red blood counts of 7,000,000 to 8,000,000 and haematocrit readings of from 70 to 80. These laboratory findings were identical with those obtained after burns of all the skin, and in both cases they are produced by the same mechanism. The peritoneum and the skin have equal areas. A great quantity of plasma escapes from the blood when the vast area of capillary endothelium in the peritoneum is damaged by infection. The osmotic pressure of the blood then becomes too low to enable it to absorb water from the tissues—cyanosis and extreme concentration of the blood then occur. Damage of the capillaries of the skin by heat causes the same chain of events.

The administration of plasma will, of course, have a very transient effect.

Death from Intermediate Obstruction

Dehydration, anoxia and starvation account for the systemic effects of intermediate obstruction.

Systemic Effects of Strangulation Obstruction

Gangrene of the bowel causes:

1. All the systemic effects of simple obstruction.
2. The systemic effects of localized, or of general peritonitis.
3. A loss, sometimes great, of blood within the tissues of the bowel wall and into its lumen.

The second and third of these require comment.

Gangrenous loops of bowel in external hernias may cause very little more systemic disturbance, even when they perforate, than a simple obstruction at the same level in the bowel. Gangrenous loops within the abdomen are isolated by the adhesion of all peritoneal surfaces in contact with them. The inflammatory exudate which quickly covers these surfaces gives the body a fairly good protection against the absorption of noxious material from the gangrenous bowel. The peritoneum can wall off a piece of gangrenous bowel as readily as it can an abscess. For this reason the idea that immediate operation should be done when the presence of gangrene is suspected is incorrect. It is safe to postpone operation a while till the patient has been properly prepared for it. Till this has been done, the danger from operation is greater than that from possible rupture of the gangrenous bowel.

The loss of blood due to gangrene of the bowel may be caused by obstruction of either a mesenteric vein or of a mesenteric artery. Obstruction of a vein causes by far the greater loss. It may be obstructed by torsion, by being pressed against a fibrous band, by incarceration in the sac of a hernia, or by thrombosis. When the

bein is obstructed, and the artery beside it open —as is usually the case—blood under systolic pressure distends the capillaries of the bowel, ruptures them and escapes into the intercellular spaces of the bowel wall and into its lumen. When the obstructed vein is a large one, the loss of blood may alone be sufficient to cause death.

Obstruction of an artery in the mesentery by thrombosis or by embolism causes a hemorrhagic infarct of the piece of bowel it supplies. The mechanism of this has been much debated. The following is the most probable explanation. The blood in the mesenteric veins is moved by the force from the heart transmitted through the capillaries. When this force is removed by plugging of an artery, blood accumulates in the tissues of the bowel because of back flow in the veins.

Systemic Effects of Paralytic Obstruction

Paralytic obstruction (adynamic ileus) may be neurogenic, or it may be caused by peritonitis. The neurogenic variety, which may be a complication of hysteria, or of a severe trauma, may, though it rarely does so, cause death from asphyxia by the mechanism already described.

Paralytic obstruction due to a really general peritonitis is, even today, always fatal because of the continued escape of great volumes of plasma through the vast area of damaged endothelium. The chief systemic effects of peritonitis are probably due not so much to toxaemia as to this loss of plasma by the blood.

Correction of the Systemic Damage Caused by Bowel Obstruction

The foregoing discussion has emphasized that the bad effects of obstruction are dehydration, anoxia, starvation and, in certain cases, infection.

Dehydration—The quantity of water which the body can contain depends upon the quantity of electrolytes—nearly all sodium and chlorine —within it. The correction of dehydration, therefore, demands that the normal quantity both of water and of salt be restored. Grave symptoms and death occur when the osmotic pressure or hydrwogen ion concentration of the body fluid varies to an infinitessimal degree from normal. The kidneys, adrenals and pituitary under normal conditions maintain its proper composition by regulating the exeretion of water and salt. Thus when the body lacks water and has its usual supply of salt, the kidneys exerete very little water and much salt. They thereby preserve the normal composition of the body fluid but at the price of reducing its volume. Likewise, when the body loses an excessive quantity of salt by sweating, gastric lavage, diarrhoea, or an intestinal fistula, the kidneys will excrete little or no salt and enough water to keep the composition of the body fluid normal. In this case also a decrease in the volume of water in the body occurs, a decrease which may be great enough to cause fatal shock.

Entirely satisfactory rules are not available to govern our administration of salt and water for the correction of dehydration. Its cause is the first guide to treatment. If this is simple lack of water, then water should be given by mouth, if possible, otherwise with glucose and with no salt, by vein. If the cause is loss of salt, then both water and salt are required.

The administration of salt solution by vein to patients who are taking no water by mouth will in some cases cause general edema and marked oliguria. This condition has been termed "salt block." It may be fatal. It is fortunately in most cases easily cured by the administration of water. This will cause an immense diuresis and rapid disappearance of the edema. The probable explanation of these occurrences is as follows:

1. The kidneys are unable to exerete salt fast enough to keep the osmotic pressure of the body water normal. Therefore enough water must accumulate in the tissues to do this. Oilguria or anuria then occurs.

2. The introduction of water into the circulation reduces the osmotic pressure of the plasma and thereby inhibits secretion of antidiuretic hormone by the pituitary. When freed from the stimulating action of this hormone the renal tubules absorb less water from the glomular filtrate and diuresis occurs. Since the glomeruli filter about 125 liters of water a day, and since the tubules absorb all but about one and a half liters of this, it is easy to understand how even a slight decrease in absorption by the tubules will cause a great diuresis.

The foregoing considerations apply also to the treatment of patients with anuria. These should be given no salt, and just enough water to replace what they lose by way of the lungs, the skin and the gastro-intestinal tract—not more than two liters a day. By this treatment the composition and volume of the body fluid is kept as nearly normal as is possible till the kidneys

recover. This may take as long as 10 to 12 days.

Van Slyke and Evans by experiments on medical students found:

1. That the volume of the plasma and the concentration of salt in it may be nearly normal even when marked dehydration exists.

2. That when the kdneys are normal the concentration of salt in the urine, and the volume of the urine, indicate how much water and how much salt the patient needs.

3. That when the plasma chloride content is 95% of normal, no salt at all will be found in the urine.

These writers conclude that, "providing kidney and adrenal function are normal, water and salt balance will probably be maintained if daily urine volume exceeds 1500 cc. and urine salt concentration approximates 3 grams per liter." The urine chloride concentration can be quickly measured at the bedside by the Fantus test with a degree of accuracy sufficient for all clinical purposes.

Anoxia—The treatment of this is deflation of the stomach and intestine. The recently introduced form of the Miller-Abbott tube has been a great improvement on previous forms of this device. It readily passes the pylorus and moves rapidly down the intestine.

For deflation of the large bowel a Senn type Cecostomy may be done through a McBurney incision, with suture of the peritoneum to the cecal wall around the tube, and very loose or no closure of the rest of the wound.

Damage done the capillary endothelium of the body by anoxia is less serious than that done by heat or infection. Recovery from it by restoration of the normal supply of oxygen, is nearly always prompt and complete.

The prevention of post-operative distention by continuous gastric lavage as proposed by the late Dr. Singleton should be used for a time on all patients who have continuous nausea or gastric distention after operation.

Starvation—Parenteral feeding is not without danger. It is at its best a poor substitute for normal feeding. Feeding by mouth at the earliest possible time is advocated. This should be attempted after relief of obstruction when a Levine tube is in the stomach as soon as the washings are free of bile, and the passage of fluid from the stomach has been demonstrated. Patients with the tip of a Miller-Abbott tube well down in the intestine often take and utilize liquid nourishment very well.

It is usually safe to feed immediately after operation patients who have had resection of the stomach or colon.

Infection—Loss of the plasma by blood is the most dangerous effect of peritonitis—more dangerous than the toxaemia it causes. Therefore the transfusion of large quantities of blood or plasma is an essential part of its treatment.

I have two observations to make on the result of antibiotic drugs on peritonitis:

1. They are most effective when given early in the course of the peritonitis.

2. They may not prevent the formation of abscesses, and may for a long time conceal their presence.

CONCLUSION

The validity of present conceptions on bowel obstruction is best shown by the low death rate which the application to the treatment has brought about.

DIAGNOSIS IN CONGENITAL HEART DISEASE

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SINCE Gross[1] successfully ligated a patent ductus arteriosus, great strides have been made in the surgical treatment of congenital heart disease. Blalock[2] first anastomosed the subclavian artery to the pulmonary artery for treatment of stenosis of the pulmonary artery as seen in the tetralogy of Fallot (pulmonary stenosis, dextraposition of the aorta, ventricular septal defect, and right ventricular hypertrophy). Potts and Smith[3] accomplished the same result by joining the aorta and the pulmonary artery. This same operation is done for tricuspid atresia and under certain circumstances for truncous arteriosus (a common trunk for the aorta and pulmonary artery). At the present time coaretation of the aorta has been successfully operated upon many times and experimental work is being done in an effort to take

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the heart temporarily out of the circulation so one can work directly within the cardiac chambers.

The number of successful operations runs well into the thousands and one needs only to contrast the preoperative cyanotic, dyspneic, cardiac cripple with the postoperative active, acyanotic, comfortable child to realize the incentive for cardiac surgery.

The all important prelude to surgery must be an accurate diagnosis. Taussig[4] in her epochal volume on congenital heart disease has laid down many of the dicta which we now follow in the diagnosis of congenital heart disease. Her work is based almost entirely on physical examination and fluoroscopy. Others have contributed confirmatory procedures. It is the scope of this paper to describe and evaluate the various diagnostic methids. These include:

1. Physical examination.
2. Fluoroscopic and roentgenologic examination.
3. Angiocardiographic examination.
4. Electrocardiographic examination.
5. Studies of circulation time.
6. Venous catheterization.

The value of the old-fashioned physical examination should not be underrated. It is this which first calls attention to the presence of a cardiac abnormality. The child may be cyanotic or dyspneic. Cardiac murmurs may be present. Clubbing of the fingers may be significant. Pulsations in the liver edge may be indicative of a tricuspid valve lesion; insufficiency, if systolic in time; stenosis, if diastolic. A patent ductus may reveal a typical continuous hum in the second left interspace described variously as a "machinery murmur" or "bees in a bag." This, together with a high pulse pressure and other signs of aortic insufficiency, is practically diagnostic. Coaretation of the aorta may be suspected by the higher blood pressure in the upper extremities. Absence of the aortic arch is to be thought of when the upper part of the body receives arterial blood and the lower part is cyanotic. Bulging of the left side of the chest usually signifies a right ventricular hypertrophy. These facts may be diagnostic in themselves or may serve as clues to what one may expect to find by other means.

Fluoroscopic and roentgenologic examinations,

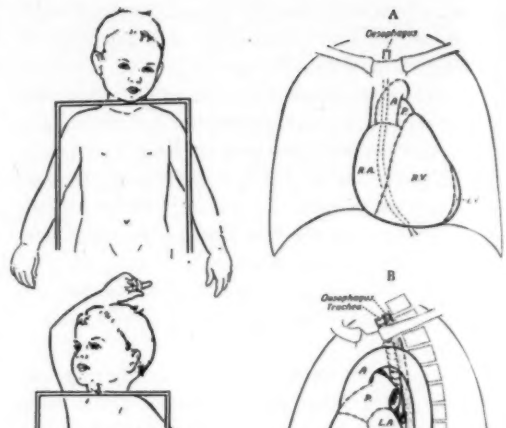


Fig. I. Three standard positions relative to the fluoroscopic screen and contour of the normal heart in each position. Child (A) Anterior-posterior; (B) left anterio-oblique; (C) right anterior-oblique.

considered as one, are perhaps the most important adjunets to diagnosis. Frequent routine fluoroscopic examination must serve to establish a knowledge of the normal heart in the various age groups. Study must be made in the anteroposterior (AP), the left anterior oblique, the right anterior oblique positions, and with the aid of swallowed thick barium to learn the size of the left auricle, the type of aortic arch (left or right) and the presence of anomalous mediastinal vessels displacing the esophagus forward. Figure I reveals the positions during fluoroscopic examination after Taussig[4] and locates the various cardiac chambers in a normal heart.

In the AP view the chambers visualized are the right auricle and the right ventricle. The left ventricle is almost entirely posterior. Gross cardiac enlargement in this view must always be due to enlargement of the right side of the

heart. The pulmonary conus can also be visualized in the AP view. Its absence indicates that the pulmonary artery is absent, small, or displaced. Enlargement of the conus may be present in patent ductus arteriosus, Eisenmenger complex[5] and Lutenbacher's syndrome.[6] A concrete example of a fluoroscopic "snapshot" diagnosis, frequently correct, is in transposition of the great vessels (aorta off the right ventricle and pulmonary artery off the left ventricle). In the AP view the mediastinal shadow is narrow as the two great vessels lie one behind the other, while in the left anterior obilque the normally narrow shadow is widened as the vessels in this view now lie alongside of each other.

In the left anterior oblique view one visualizes the two ventricles. The right ventricle approaches the sternum and if large, as in the tetrology of Fallot, it may reach the anterior chest wall. The size of the left ventricle can be gauged within limits by the amount of rotation necessary to clear the vertebral column.

In the right anterior oblique view one sees the right auricle and the right ventricle and pulmonary conus, while posteriorly in juxtaposition to the esophagus lies the left auricle. It is in this view that a swallow of thick barium will reveal an enlarged left auricle displacing the esophagus posteriorly. (See Figure II.)

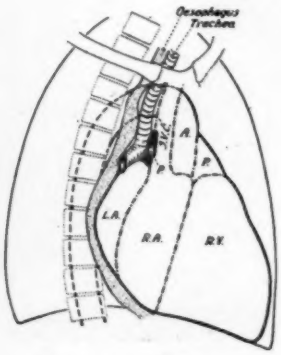


Fig. II. L. A. Large left auricle displacing the esophagus posteriorly.

The hilus "dance" is seen in patent ductus arteriosus, auricular septal defect, or any condition in which the pulmonary artery is enlarged and circulation to the lungs increased. It can be studied only under the fluoroscope and consists of pulsation within the lung hilus. To study it, be sure to cover the heart shadow so as not to confuse this with cardiac motion. In passing it is well to note that a stenosed pulmonary artery never causes a hilus "dance." All other data perceived by fluoroscopic examination can be recorded by roentgen rays. The roentgenogram, however, has its greatest value in angiocardiography.

Angiocardiography is the study of the heart by roentgenograms as diodrast 70 per cent is passing through its chambers. It is done by rapidly injecting the dye into the antecubital vein and then taking multiple roentgenograms in a short time. Carson[7] uses the tautograph and gets ten exposures in 10 seconds. This equipment is expensive and we have been able to accomplish the same purpose by manual propulsion of the casettes in a channeled flat box which just fits the top of the x-ray table. The casettes are propelled by a long stick to the cardiac position as the patient lies prone. The operator is able to get six exposures in 5 seconds. This is sufficient for most angiocardiographic studies. Foster[8] is preparing a manuscript giving the details of this technique so it is omitted here.

Angiocardiography was pioneered by Castellanos[9], and Sussmen[10, 11, 12]. Carson[7] and others have done much to further the technique. The generally accepted technique consists of fasting the patient for 4 hours before the procedure is begun. The patient is placed on the table and if too young to co-operate, a general anesthetic is used. With the patient in place a cut down is done and the antecubital vein is cannulized with a No. 13 or No. 14 cannula. Just prior to injection the cannula is cleared with normal saline. Then a few drops of the diodrast are permitted to enter the vein. If in a few minutes there is no reaction, the entire injection is made as rapidly as possible. Infants under one year of age receive 10 c.c.; those of agres one to two years receive 15 c.c.; those of ages two to ten years receive 25 c.c. Older children and adults receive 30 to 40 c.c. X-ray exposures are begun the second the injection is completed. Interpretation of the angiogram requires a great deal of experience. Figure III shows X-ray exposures of a normal angiogram.

More recently, to establish the diagnosis of persistent ductus arteriosus in atypical cases and coaretation of the aorta, retrograde arteriography is being done. To accomplish this, various arteries are used to make the injection.

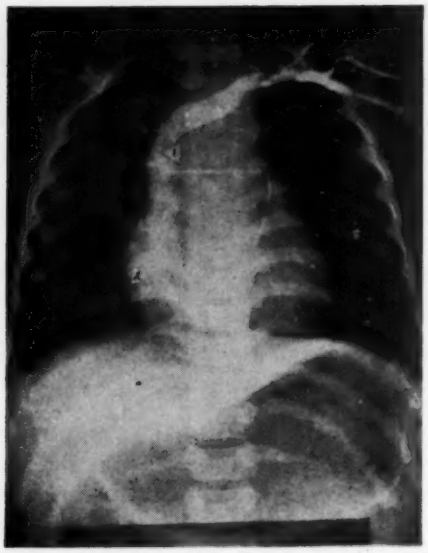
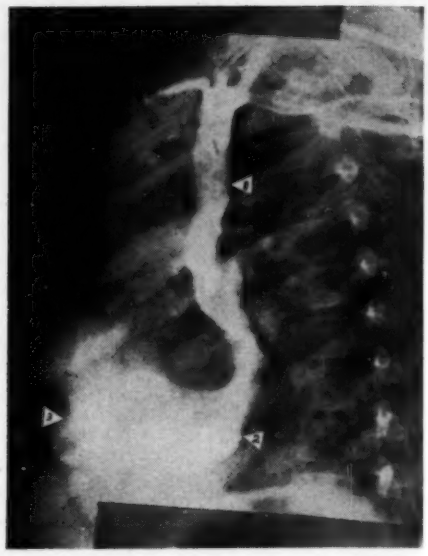


Fig. III. A. Normal angiocardiogram, anteroposterior. 1, Superior vena cava. 2, Right auricle.



C. Normal angiocardiogram, left anterior oblique. 1, Superior vena cava. 2, Right auricle. 3, Right ventricle.

B. Normal angiocardiogram, anteroposterior. 1, Right ventricle. 2, Pulmonary artery. 3, Left pulmonary artery. 4, Right pulmonary artery.

D. Normal angiocardiogram, left anterior oblique. 1, Pulmonary conus. 2, Left pulmonary artery. 3, Right pulmonary artery.

Farinas[13] put a catheter in the femoral artery and passed it up into the aorta before injecting the dye. Castellanos[14] used the brachial artery. Burford and Carson[15] have used the carotid artery with good results. Figure IV reveals a patent ductus. Fig. V reveals a coaretation of the aorta.

It can be seen that the methods described furnish a great deal of information and are a necessary adjunct in the diagnosis of congenital heart disease.

The electrocardiogram is of only minor value in the diagnosis of congenital heart disease. The two most conspicuous exceptions to this rule are

Fig. IV. Left anterior oblique radoigram. 1, Patent ductus arteriosus. 2, Descending aorta. 3, Pulmonary artery. 4, Left subclavian artery. 5, Left common carotid artery. 6, Innominate artery.

Fig. V. Left anterior oblique radiogram. 1, Left common carotid artery. 2, Left subclavian. 3, Point of constriction of descending aorta.

in tricuspid atresia with congenital absence of the right ventricle, and in an aberrant left coronary artery arising from the pulmonary artery instead of the aorta. In the former, there is a marked left axis deviation not usually found in other types of congenital heart disease. In the latter, the EKG reveals a pattern similar to that seen in occlusion of the left coronary artery. The tricuspid atresia responds to operative therapy. Aberrant left coronary artery to date has been universally fatal but at present shows a promise of correction if Gasul's[16] theory is right. Gasul believes that the cause of death is not because there is venous blood in the left coronary artery. He points out that even venous blood contains 70 per cent 0_2 and that this is greater than obtains in many types of congenital heart disease that survive for years. He thinks it is due to lack of pressure in the coronary artery and will respond to the Potts-Smith[3] type of operation. To date this has not been corroborated.

The circulation time is the measured interval between the injection of a test substance and its recognition at various points in the body. We have used the fluorescein method exclusively because it is an objective method. The technique consists of injection of this dye* into the antecubital vein. A 21-gauge needle is used and 0.7 c.c. per 10 lbs. body weight is given. The injection must be made very rapidly in a dark room. An ultraviolet lamp is concentrated on the lips. The elapsed time between the injection and the appearance of a brilliant green on the lips is the circulation time. The normal is from 5.5 seconds to 8.5 seconds, averaging 6 seconds. In the presence of various types of congenital heart disease it is much less. This, to a large part, depends upon circumventing the pulmonary circulation when the right side makes direct contact with the left side of the heart or the great vessels are transposed. Complete transposition where the aorta comes off the right side of the heart gives the shortest time, about 2.5 to 3 seconds. In tetralogy of Fallot the circulation time is 2.5 to 4 seconds. Septal defects give shortened circulation time only when the pressure on the right side is greater than on the left and the shunt is from the right auricle or ventricle to the left, avoiding the pulmonary circulation. This is not common. This is a valuable confirmatory test and easily done.

Venous catheterization consists of the passing of a fine catheter from the right antecubital vein upward through the superior vena cava into the heart. As the catheter proceeds it enters the right auricle, the right ventricle, and with

*Manufactured commercially as "Fluorescite" by C. F. Kirk Co., New York, N. Y.

some practice on the part of the operator, the pulmonary artery. This operation must be done under constant fluoroscopy to observe the position of the catheter. Its great value lies in the study of the 0_2 content and the pressures in the various vessels and heart chambers. For example, normally the venous blood in the superior vena cava and the right auricle have the same 0_2 content, but if the auricular septum is defective the right auricle will get a reflux of blood from the left auricle and its 0_2 content will be raised. The same holds true for a ventricular septal defect. Normally, also, the pressure in the right ventricle and the pulmonary artery are almost identical. If the pressure, as measured during cardiac catheterization, is much greater in the right ventricle than in the pulmonary artery, it suggests a pulmonary stenosis. This is probably the most difficult of all diagnostic procedures in congenital heart disease.

Perhaps the best way to illustrate these diagnostic procedures is to take a specific case and run through the gamut of diagnosis. As our example we shall discuss the tetralogy of Fallot (pulmonary stenosis, dextraposition of the aorta, ventricular septal defect and right ventricular hypertrophy). On physical examination we see usually a slight, dyspneic and cyanotic child. The child is able to be about but does not tolerate exertion. Examination may reveal the left side of the thorax to be bulging. A systolic murmur is present and is heard best in the left third interspace. On fluoroscopic examination in the AP the pulmonary conus is small or absent. The left side of the heart is enlarged. As the child is rotated to a left anterior oblique position the right ventricle is seen to be enlarged. The left ventricle is of normal size. We have now fulfilled two of the four tenets, viz., pulmonary stenosis and right ventricular hypertrophy.

Angiocardiagraphic examination reveals that the dye enters the aorta directly from the right ventricle, proving the presence of dextraposition of the aorta. The small amount of dye in the lungs corroborates the pulmonary stenosis and the point of stenosis may be observed. A common finding is a post stenotic dilatation. This occasionally will cause an error in interpretation. If dextraposition of the aorta is present, a high ventricular septal defect must also be present. This completes the components of the tetralogy. The EKG shows a marked right axis deviation because of the right ventricular hypertrophy. The circulation time is rapid as the dye enters the aorta directly from the right ventricle without traversing the lungs. On venous catheterization the blood in the right ventricle is under increased pressure because of the pulmonary stenosis, while the pressure in the pulmonary artery beyond the point of stenosis is decreased. The diagnosis thus being established, surgical treatment can be anticipated.

There are a few other tests and many other signs which cannot be covered in a paper of this type.

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Figures I and II, reprints from CONGENITAL DISEASE OF THE HEART through the courtesy of Helen B. Taussig, M. D., and the Commonwealth Fund.

Figures III, IV, and V, reprints from the recent JOURNAL OF PEDIATRICS through the courtesy of the Drs. T. H. Burford and M. J. Carson, and the Journal of Pediatrics.

THE USE OF QUINIDINE

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QUINIDINE has been known to the medical profession for a period of thirty-seven years. It is one of the most valuable drugs in our cardiac armamentarium. Heart disease is the leading cause of death today, and quinidine, when properly used, is capable of saving and prolonging countless lives. Its improper use is based upon groundless fear, fear which was engendered by the incorrect use of the drug during its early days.

The drug, to our knowledge, was first used in the treatment of clinical heart disease by Wenckebach in 1912 when a patient of his called attention to the fact that his attacks of paroxysmal auricular fibrillation could be dispelled by the use of quinine. Further study soon showed that quinidine, a derivative of quinine, was a more active principle than the entire drug, and it has been used since that time. It is of value before embarking upon any discussion of the clinical use of this or of any other drug to point out briefly its pharmacological properties. Experimental work has demonstrated that quinidine: (1) increases the refractory period of the cardiac musculature, (2) decreases the excitability of cardiac musculature, (3) slows conduction through the heart, (4) depresses the vagus nerve, and (5) that large doses of the drug depress contractility of the cardiac muscle. If we superimpose and compare the action of this drug to that of digitalis, it will be seen that if the drugs are used together quinidine will favor the occurrence of bradycardia and of auriculoventricular block but its action will be contrary, in part, to that of digitalis in that it will decrease the excitability and contractility of the cardiac muscle. It follows, therefore, as a corollary, that digitalis is capable of preventing excessive depression of contractility when the latter is due to quinidine.

Some of the clinical uses of this drug which do not occur frequently are reasonably well established, and there is, in general, a unanimity of opinion as to the value of the drug in these conditions. I refer to such clinical entities as paroxysmal ventricular tachycardia, the prophylaxis and treatment of paroxysmal supraventricular tachycardia, and the frequently unsuccessful use of the drug in the abolition of premature auricular or ventricular contractions. In none of the aforesaid clinical entities does there seem to be any real contraindication to the use of the drug, and no one apparently believes that it does harm, even though all are not agreed upon the amount of good that it may do. The greatest controversy about the use of quinidine is in association with auricular fibrillation, particularly when this arhythmia is superimposed upon previously existing organic heart disease; and yet, if quinidine is of value in this condition, it would undoubtedly account for its greatest use, since auricular fibrillation far exceeds in clinical frequency and in clinical importance the other conditions mentioned above. This discussion will, therefore, be limited to the use of quinidine in auricular fibrillation which is not of functional origin.

The drug was first used in this condition by Frey[1] in 1918, and at that time it is significant to note that he advised against the concomitant use of digitalis because he felt the latter drug would probably promote fibrillation. This statement is physiologically correct, and many of us have seen auricular fibrillation as a manifestation of toxicity from digitalis. It requires enormous doses of the drug to produce this arhythmia, however, and in general clinical practice its occurrence is rare and statistically insignificant. Unfortunately, the recommendation given by Frey was accepted without question and soon became medical law. Only four years later, in 1922, Eyster and Fahr[2] gave a report on the use of the drug for auricular fibrillation in this country. They reported one case of neurogenic paroxysmal auricular fibrillation in which the result was brilliant and to their knowledge, permanent. That the drug is indicated and is successful in this condition is denied by none, and it is agreed that previous digitalization is not important. Eyster and Fahr, however, reported another patient who had an old rheumatic, decompensated heart and who reacted badly to the use of quinidine, manifesting cyanosis, tachypnea, and collapse. It is significant that the latter patient received no digitalis, either immediately prior to or during the use of

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quinidine. In the same year Smith[3] reported one case with complete failure to revert to sinus mechanism following a reasonably intensive dosage of quinidine. This patient, too, received no digitalis since it was the opinion at that time that the two drugs used together would produce serious toxic effects. Three years later Smith and Clarke[4] reported on twenty patients, all of whom had had digitalis discontinued prior to the administration of quinidine. A permanent reversion to sinus rhythm was obtained in only four patients, or 20 per cent of the entire group. They did not include any patients who had had cardiac failure, and, therefore, they did not include their most seriously ill patients. Sixty-one per cent of the cases reverted to a sinus rhythm for a short period of time, and one death was reported from cerebral embolism which followed twenty-nine hours after the last dose of quinidine. The authors blamed this catastrophe on the drug. Lewis has since pointed out that all of any given dose of quinidine administered to a human being is excreted within twenty-four hours.

Sixteen years later there had been a marked swing of opinion about the simultaneous use of digitalis and quinidine. Fahr[5] reported 500 patients with auricular fibrillation in whom quinidine had been used with a 65 per cent successful conversion to a sinus rhythm. In this report he quoted the bad results that he had had in 1922[2] and stated that he had since learned that thorough digitalization should and must precede the use of quinidine. In this group of 500 cases Fahr had no sudden deaths. In 1947 Weisman[7] reported 70 per cent success in 500 patients with auricular fibrillation. Here, again, digitalis was used routinely together with quinidine. In spite of the better experiences and the greater success with the drug when it was employed in conjunction with digitalis, as recently as 1945, Harry Gold[7] advised against the use of quinidine in any patient who has been given a large dose of digitalis. It is apparent, then, that the question has still not been entirely settled, and that for the "diehards" further statistical studies will have to be presented before they will accept the use of this life-saving drug in its proper place.

If quinidine is to be used with digitalis, the next question is — under what circumstances should the drug be used? The older teachings have always pointed out that quinidine should never be used in (1) the older age group, (2) auricular fibrillation of more than three months' duration, (3) coronary sclerosis associated with auricular fibrillation, (4) heart failure, and (5) recent myocardial infarction. If we analyze these conditions singly and briefly the following evidence may be presented to controvert the older teachings. As far as its use in the older age group is concerned, Weisman[7] pointed out, in a study of 500 cases, that he was more successful in converting auricular fibrillation to a sinus rhythm in patients with arteriosclerotic heart disease than in those with rheumatic disease, and greater success was obtained in the older age group although specific figures are not cited. The same author, in a discussion of Fahr's paper again pointed out that the hypertensive and sclerotic groups respond better than do the rheumatic patients. Passing to the second contraindication to the use of quinidine; if we limit its use to those patients who have had auricular fibrillation for less than three months, we will be faced with the following dilemma: many of our patients will be those with paroxysmal auricular fibrillation, and most of these will spontaneously revert or will revert easily following the dose of an ordinary sedative. Our more seriously ill patents will almost invariably have had their arhythmia for a period of longer than ninety days, and if the drug could be successfully used in these patients, *and it can*, we shall have performed in many cases a life-saving function. The so-called contraindication in patients with coronary sclerosis who are fibrillating can be disposed of by pointing out that these patients will invariably be in the older age group, and these do well. All authors are agreed that in the presence of heart failure quinidine is dangerous and generally that it should not be used. Although I am in agreement with this general statement I do feel that quinidine should be given a trial in all patients with auricular fibrillation and heart failure who do *not* respond well to the usual measures employed for heart failure. Many such patients, if properly quinidinized, can be returned to an ambulant status and to a reasonably useful existence. It has been my practice routinely, to place all patients with myocardial infarction, whether or not they have fibrillation, on small tonic doses of quinidine, usually 3 grains four times daily, in the belief that this measure will reduce the incidence of paroxysmal ventricular tachycardia and, more important, ventricular fibrillation. Smith, Me-

Eachern, and Hall[8] in 1940 tied off the circumflex branch of the left coronary artery in dogs, and treated one-half of them with quinidine and the other one-half without it, and found that in those animals which had been given quinidine there was a 55 per cent mortality and for those which had not been given the drug there was a 75 per cent mortality. Experimentally, then, there is good evidence that not only is quinidine not contraindicated in recent myocardial infarction but that it may be of value. My own experience bears this out.

Actually, what are the dangers of this potent drug? Chiefly, they are those of embolism, sudden death, and of ectopic ventricular rhythms, and these dangers have been so emphasized in the medical literature that the drug is frequently excluded from consideration in patients in whom it might prove to be life-saving. Askey[9] has discussed this, carefully and reasonably, and has pointed out that embolism occurs in approximately four per cent of the patients who have received the drug if they are followed for a few days after conversion to sinus rhythm. In a similar group of patients who did not receive quinidine, the incidence of embolism over a relatively longer period of time was again precisely four per cent and if one calculates the incidence of embolic phenomena in all patients with auricular fibrillation over the period of their lifespan, the rate varies from 15 to 20 per cent. Similar statistical studies have been made with similar results, and very few who are interested in this subject will today advance—increased incidence of embolism—as an adequate reason for not using quinidine. The matter of sudden death is one that has to be taken more seriously. Sudden death in any patient who is taking quinidine may occur from cardiac standstill, from ventricular fibrillation, or from respiratory paralysis. Ventricular fibrillation is so rare that is can be statistically disregarded. The incidence of sudden death varies with the experience of different clinicians. Parkinson and Campbell[10] reported a four per cent incidence of sudden death in 554 patients with auricular fibrillation treated with quinidine. Interestingly enough, one year later Cookson[11] found a 10 per cent incidence of sudden death in 86 fibrillating patients who received no quinidine. All authors agree that sudden death is more common and therefore to be more greatly feared when quinidine is given to patients with auricular fibrillation who are simultaneously suffering from cardiac failure. Here, again, the use of digitalis is to be emphasized, and Wolff and White[12] in 1929 felt that sudden death was more common in patients who had not been given and maintained on digitalis. The danger of emboli, then, is one that has largely existed in the imagination of the older clinicians, and repeated large-scale statistical studies have proved that the immediate incidence of emboli following quinidine therapy is approximately the same as that which occurs without the drug. Over a longer period of time patients who are given quinidine will have approximately one-fourth the incidence of emboli as will those who are never given the advantage of the drug. Sudden death still remains a real threat; and yet, as pointed out by Wolff and White[12] and emphasized by Fahr[5], it is unlikely to occur in patients who are given and maintained on digitails. I wish to drive this home most forcefully—that in any given patient with organic heart disease, and most particularly if that patient is in heart failure, quinidine should never be employed (except in cases of extreme urgency) unless the patient is first thoroughly digitalized and then maintained on adequate doses of the latter drug.

If then, it is believed that we can use quinidine with more than reasonable safety in our more seriously ill patients with auricular fibrillation, what then do we hope to obtain by conversion to a sinus rhythm? Here, too, there is much confusion, and authorities like Katz[13] have stated that the mechanical efficiency of a fibrillating heart which has been adequately slowed with digitalis is not at all improved if that same heart is converted to sinus mechanism by quinidine. And yet numerous well-controlled laboratory studies have been made, such as those of Smith, Walker, and Alt,[14] which show that the cardiac output of a fibrillating heart is from 15 to 79 per cent less than that of the same heart after normal rhythm has been established. The average improvement they noted in mechanical efficiency following abolition of auricular fibrillation was from 20 to 30 per cent. Kerkhof,[15] who made minute volume determinations in patients with mitral stenosis, and fibrillation showed that in his experience the efficiency of the heart was increased approximately 25 per cent after regular rhythm was restored. If, then, we have availabe a drug which will, on the average, improve these sick hearts by 25 per cent,

(and this is an enormous increment) and if, of the two dangers, namely embolizaton and sudden death, that have been attributed to this drug one has been shown statistically to be non-existent and the other has been shown to be very uncommon when the drug is given only to digitalized patients, does it not seem negligent to deny the use of so efficient an agent to the large group of fibrillating hearts who will not respond to digitalization, diuresis, low-sodium diet, and other routine measures, to the extent where they are able to get out of bed and to perform some type of gainful occupation? Admitting that a small but real danger of sudden death exists, are we not justified in giving the patients who are otherwise hopelessly chronic invalids the chance of improving their diseased hearts by about 25 per cent which in many cases is enough of an increase to return the patient to some type of active life?

Fahr[5] used this drug in 500 patients and did not have a sudden death. During the same year, Smith employed the drug in the treatment of 41 patients with auricular fibrillation and had 4 examples of sudden death, or approximately a 10 per cent incidence. The only difference in the management of these two groups of patients was that Fahr's group was given digitalis and maintained on it and Smith's group was not given this drug or it was discontinued if it had been previously employed. So marked a difference in the statistical incidence of sudden death cannot be charged to chance, and digitalis was the only differential treatment in the two groups. If we return to the original paragraph of this paper in which it was pointed out that digitalis can prevent excessive depression of contractility due to quinidine, we have a sound physiological reason for the marked difference in the two groups mentioned above.

One case will be cited to illustrate what can be accomplished. N. K., 58 years of age, was admitted to a Phoenix hospital on December 18, 1947 with the essential complaints of profound weakness and shortness of breath, which had been present intermittently for five years. He was of Greek extraction. He stated that he had known rheumatic heart disease for approximately 20 years and for the past nine years he had known that his heart beat was quite irregular. During the three weeks prior to this hospitalization his shortness of breath became more marked, swelling of the feet and ankles appeared for the first time, cough became incessant and produced some, occasional bloody, sputum, and in general his health had declined rapidly.

The examination done at the time of his admission revealed a fairly well-developed and poorly nourished individual who was apparently severely ill, quite orthopneic, and moderately cyanotic. The temperature was 103.4°F., the pulse was 148 per minute and was totally irregular, the blood pressure was 100/70, and the respirations were 48 per minute. There was moderate cyanosis of the lips and of the nailbeds. The neck veins were distended and could be easily made to fill from below. Dullness was present over both lung fields posteriorly, and auscultation disclosed many fine moist rales, bilaterally. The point of maximum impulse of the heart was in the 6th interspace at the anterior axillary line. A grade II, blowing, apical, systolic murmur was heard, and a grade I blowing, aortic, systolic murmur was also detected. The rhythm was "irregularly irregular," characteristic of auricular fibrillation. The liver was enlarged approximately five fingers width below the right rib margin, and shifting dullness was demonstrated in both flanks. There was a two plus pitting edema in the feet and ankles. The venous pressure, measured by the direct method in the brachial vein, was 42 cm. of water, and the circulation time from the arm to the tongue, with the use of Decholin, was 32 seconds. The erythocyte count was 4,300,000 per cubic millimeter with 13 gms. of hemoglobin. The leukocyte count was 11, 650 per cubic millimeter with a differential count of 87 segmented forms, seven lymphocytes, and six stab forms. The blood Kahn reaction was negative. The urine was amber in color, acid in reaction, concentrated to 1.024, contained a faint trace of albumin, was negative for sugar, and was essentially normal microscopically. The blood NPN was 34.5 mgm. per cent. Roentogen examination of the chest revealed marked cardiac enlargement in all directions with bilateral pulmonary congestion. An electrocardiogram taken shortly after admission disclosed rapid auricular fibrillation and evidence of digitalis effect. The patient was promptly placed on a Schemm diet, maintained on Digoxin, .25 mgm. twice daily, given oxygen by the nasal catheter with a flow of ten liters per minute, and he was given symptomatic treatment for pain and restlessness. The following day he was worse and considered to

be critically ill. On the third day he was still cyanotic, the lungs were still moist, orthopnea was persistent, and it was the opinion that this was a seriously impaired heart that would not compensate on routine management, and so, despite the classical contraindications, quinidine should be tried. On the next day, following a test dose of three grs. of quinidine, he was given six grs. of quinidine sulfate every hour for five doses. This produced no effect, and the patient continued to go down hill. Two days later, quinidine was ordered in doses of three grs. to be increased by three grs. every four hours until the pulse rate became regular or until toxic symptoms had set in. After a single dose of 18 grs. of quinidine, sinus rhythm occurred as demonstrated electrocardiographically. The compensation improved remarkably. The urinary output, which had averaged from 400 to 500 c.c. daily prior to the successful use of quinidine and which could be increased up to 900 c.c. by giving 2 c.c. of Mercuhydrin intramuscularly, now averaged from 1500 to 1800 c.c. daily; the patient's weight decreased in the nine days following conversion to sinus rhythm from 168 to 152 lbs. The cardiac rate remained regular at approximately 84 per minute. The lungs began to clear. The liver receded so that it could be felt only two fingers below the right rib margin. The peripheral edema disappeared entirely. The cyanosis was no longer present even when oxygen was not used. The venous pressure decreased to 16 cms. of water, and the circulation time from the arm to the tongue decreased to 21 seconds. The patient was discharged from the hospital two weeks later, and was then seen on an ambulatory status, and for the 16 months period to the time of this report, he has been able to be up and about daily, and for the last month he was doing bookkeeping for approximately four to five hours daily. He was continued on maintenance doses of digitalis, and three grs. of quinidine four times daily, and the sinus rhythm persisted.

The experience cited in the above case has been repeated a number of times, but unfortunatetly it cannot be said that such dramatically successful results are invariably obtained. During the past three years records have been reviewed of 100 successive private patients who were seen with auricular fibrillation of more than six months' duration. Of this group of 100 patients 19 failed to respond sufficiently to the routine treatment so that they were given quinidine therapy. Of these 19 patients 13, or 68 per cent, were found to have a sinus rhythm, and nine of them maintained it six months after the initial conversion. Of these nine all were ambulatory. Four of them had rheumatic heart disease and five had arteriosclerotic heart disease. In the total group of 19 patients there was one sudden death. This occurred in a 29-year old female who had rheumatic heart disease, auricular fibrillation, and failure of both the right and left sides of the heart. She died suddenly while stting up in bed, approximately four hours after she had received only a test dose of three grs. of quinidine sulfate. In my opinion, it would be difficult to attribute this death to the use of quinidine. An autopsy failed to disclose any anatomic cause of the death, and it was believed that some such mechanism as ventricular fibrillation or cardiac standstill had come into play. One patient, four days after the conversion to a sinus rhythm, projected an embolus to the right popliteal artery. Medical treatment to improve the collateral circulation was successful, and the patient did not lose her limb. One again wonders whether this could be cited as a direct result of quinidine since it occurred ninety-six hours after regular rhythm had been established. One of the four patients, who were converted but who could not maintain the conversion for a period of six months, died and three are alive but are cardiac invalids who are unable to leave their homes. Three of the six patients, who could not be successfully converted even for a short period of time, died within a six months' follow-up period, two of the remaining three were mildly ambulatory, and the other was confined to his bed.

The above series is small and is not statistically important, but in any given individual case if one is successful in converting a rapid and hopeless auricular fibrillation to a normal sinus rhythm, the resultant improvement is usually remarkable. Quinidine is a drug which, as stated above, can be of life-saving value to properly selected patients, and it is urged that the old-timeworn contraindications be discarded and that the usefulness of the agent be re-evaluated in the light of more recent clinical and physiological experience. Since the danger of peripheral embolization is statistically almost nil, and since the danger of sudden death is almost nonexistent in patients who do not have severe car-

diac failure and is small in patients who do have advanced cardiac failure provided that digitalis is given, it is suggested in conclusion that in quinidine sulfate we have an extremely valuable drug which is capable of saving and prolonging life; that it should be given in the presence of organic heart disease only after digitalis has first been employed to its fullest extent and subsequently maintained. In contradistinction to previous teachings the concept should now be laid down that the more serious the organic heart disease which is associated with the auricular fibrillation the greater is the justification for the use of quinidine. Any patient with organic heart disease and auricular fibrillation who cannot be adequately maintained with routine treatment for cardiac decompensation should not be denied the use of quinidine.

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THE SURGICAL REPAIR OF A HEART LACERATION

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THE purpose of this paper is to report a case of successful repair of a cardiac wound in a six-year-old boy whose recovery has been followed with serial electrocardiograms. This case is of interest because he is one of the youngest individuals, age six years, to suffer such injury and recover. One other boy of the same age has been reported to have survived a similar injury.

On June 13, 1947 the patient fell on a milk bottle, and a fragment of the glass penetrated the left anterior precordial area. The skin laceration was approximately one and one-half inches long. Profuse bleeding occurred. Within ten minutes he was in the emergency room of a local hospital. He was still bleeding profusely from the puncture wound. Arterial pulsations were absent and he was in profound shock. There was a sucking sound through the wound with each inspiration indicative of a pneumothorax.

To prevent further pneumothorax a vaseline pack was placed over the laceration, and pressure was used to maintain it in position. Plasma was given intravenously, and oxygen was administered through a nasal catheter. The patient's color improved, and his pulse soon could be obtained. A roentgenogram of the chest revealed a pneumothorax on the left, with fluid present. The erythrocyte count was 2,600,000 per cubic millimeter. The bleeding stopped. He was taken to the operating room, and a cannula was inserted into the saphenous vein at the ankle in order that blood could be given rapidly. The intubation, for the administration of the anesthesia, resulted in spasmodic coughing which evoked a gush of blood from the chest wound. The patient again became pulseless, respiration ceased, the pupils dilated, and it was apparent that he was rapidly becoming exsanguinated. Blood was allowed to run rapidly through the cannula in the ankle vein. An anterior incision was quickly made at the level of the fifth intercostal space into the pleural cavity.

The cartilages of ribs five and six were cut in order to give an adequate exposure. An index finger was inserted through a rent in the pericardium and was passed readily into the right ventricular chamber through the large laceration in the muscle of the right ventricle. With the index finger acting as a plug, plus the rapid administration of blood, the heart soon began to beat vigorously. This temporary hemostasis was maintained until the first suture could be placed. It was somewhat difficult to place the initial suture in the beating heart. The laceration was located in the central portion of the right ventricle (Figure 1A). Figure 1B illustrates the incision used. The rapid access to the heart as a result of this incision through the musculature of the fifth intercostal space was of prime importance.

The first catgut suture was placed deep into the muscular wall of the ventricle on either side of the laceration with a portion of the pericar-

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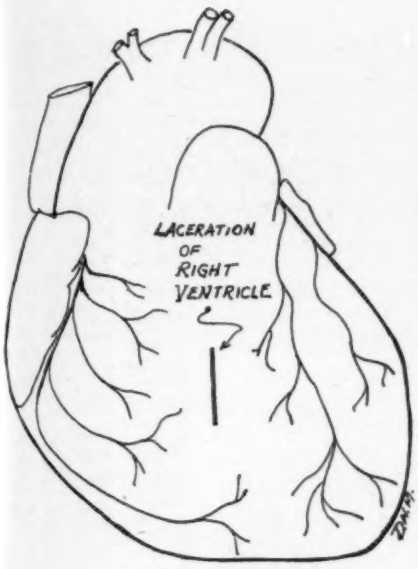

Fig. I-A

Fig. I-B

dium. The index finger was withdrawn from the wound and the suture tied. Bleeding was, for the most part, controlled, but at each ventricular contraction blood would spurt from either side of the first suture. Two more catgut sutures were placed deep in the ventricular muscle on either side of the first suture, and complete hemostasis resulted. A portion of pericardium was cut free where it had been incorporated in the first suture. The free pericardial graft was then used to cover the wound by the use of four additional mattress silk sutures. The defect resulting from the excision of this pericardial graft, plus the vigorous beating of the heart, made it impossible to close the pericardium. The heart was therefore devoid of pericardium over an area the size of a quarter. During this short space of time consumed by the surgery, and immediately thereafter, the patient had received 1,000 cubic centimeters of blood, and his condition was considered satisfactory. It was unnecessary to give any more blood transfusions. The pericardial sac and the left pleural cavity were evacuated of blood and blood clots, and a small Pezzar catheter was brought out the seventh intercostal space laterally through a puncture wound. This catheter was used later to assist reexpansion of the left lung and for aspiration of the accumulated serosanguineous effusion that resulted. Fifty thousand units of Penicillin were placed in both the pericardial sac and the pleural cavity, and the chest closed. At the termination of the operation the blood pressure was normal and the patient's general condition was excellent.

The postoperative course was characterized by a fever which persisted for two weeks but gradually subsided to normal from a high of 102 degrees. A superficial wound infection at the anterior end of the incision was drained and eventually healed without further complications. During this time auscultation of the heart was carried out on numerous occasions and failed to reveal a friction rub. Other clinical evidences of pericarditis were not detected. The quality of the cardiac tone was good at all times, and there was never any detectable cardiac irregularity.

Serial electrocardiograms were made daily, weekly, fortnightly and monthly as changes indicated. The special chest lead with the electrode in the midclavicular line in the second left intercostal space was necessitated early by the surgical dressings. It was continued afterward to afford comparison with the standard CF leads. There may have been slight variations in the positioning of the precordial electrode by different technicians, since no semi-permanent marks were made to indicate the positions.

The electrocardiograms show a sinus rhythm throughout. The heart rate varies from 120 in

the first to 77 per minute in later ones. The PR interval is 0.12 second, and the widest QRS is 0.08 second. The P waves become slightly more peaked and taller after the first few days, then gradually return to normal. There is an S_1 and Q_3 which vary somewhat in amplitude, generally becoming smaller.

In Figure II the first tracing shows an elevation of ST_1 and a depression of ST_3 which sags. During the first week T_1 and T_2 became flat-

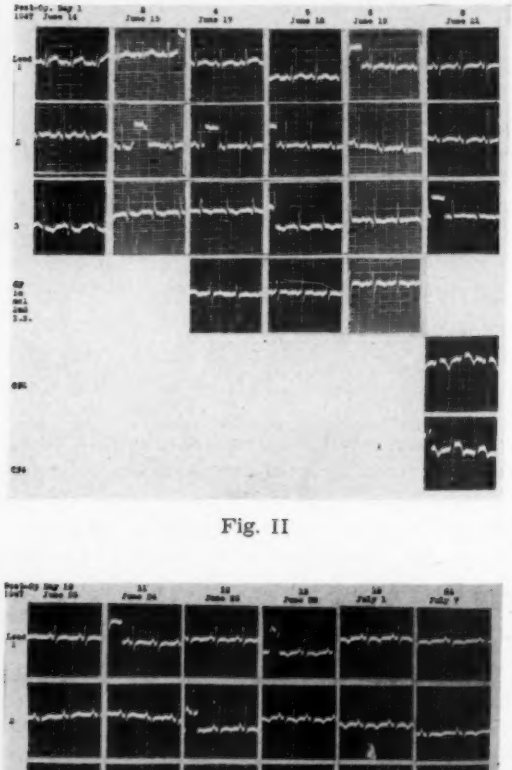

Fig. II

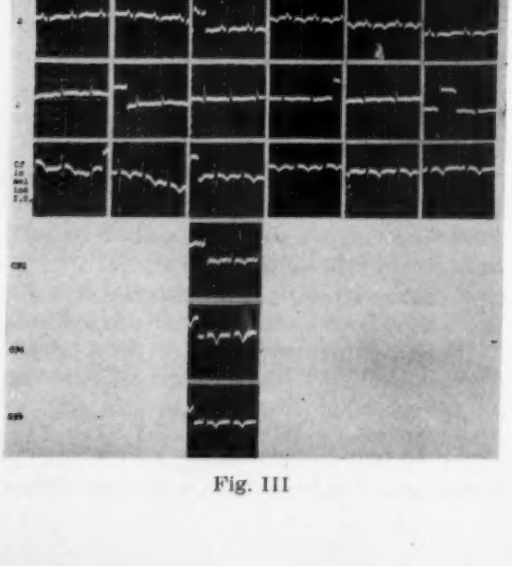

Fig. III

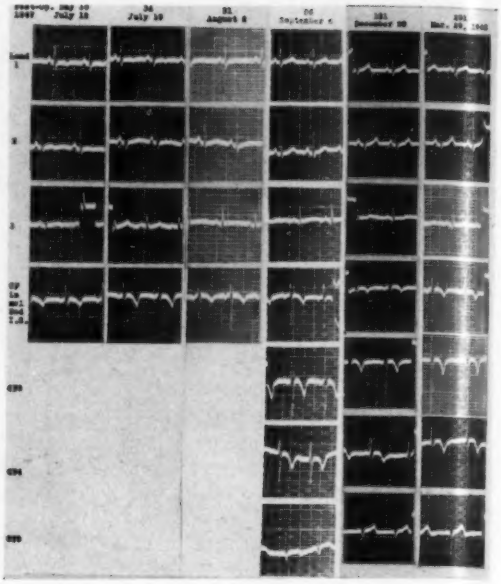

Fig. IV

tened, T_2 became notched, and T_3 is less deep. The T wave of the special chest lead changes from a low upright to a shallow inversion. By the eighth day the ST segments in all the limb leads are bowed, T_2 is notched, and CF_2 and $_4$ show an elevated ST with early T inversion.

In Figure III by the twelfth postoperative day the T-wave inversion is apparent in all the leads. It is most pronounced in the limb leads on the eighteenth day, although by the twenty-fourth day this inversion is receding. In Lead 3 the wave becomes slightly upright by the twenty-fourth postoperative day.

In Figure IV, T_2 becomes upright by the 36th day, and T_1 by the 51st day. In the CF leads the T wave inversion progresses until the 51st postoperative day. The T wave in CF_5 is upright on the 86th day. The T waves continue gradually to return to normal until the 291st day except in the CF leads where it was still inverted in CF_2 and $_4$, and in the special lead which was upright on the fourth postoperative day.

It is believed that this series of tracings represent evidence of anterior wall injury on the first postoperative day (elevation of ST_1), then the combined effects of myocardial injury and pericarditis, although he had no recognized clinical evidence of the latter. After the 36th postoperative day, persisting T wave inversion in the

CF leads indicates an anterior wall injury, since they are deeper than normally expected at his age and because the special chest lead was originally upright.

Davenport[1] in 1924 reported the first serial electrocardiograms, four, taken on a patient with a surgically repaired puncture wound of the heart. The wound involved the central portion of the right ventricle anteriorly. The first tracing on the nineteenth postoperative day showed an S wave in Lead 1, Q waves in Leads 2 and 3, with T wave inversions in all the limb leads. The wound and electrocardiographic tracings resemble those of the case described herein.

In 1941 Solway, Rice and Solway[2] analyzed twenty-three cases including one of their own. They concluded that localized anterior heart wounds in the left ventricle usually produce the T_1 pattern of an anterior wall infarction. If the wound is in the right ventricle, T wave inversion occurs in all the limb leads, and pericarditis usually occurs regardless of the location of the wound and produces elevation of the ST segments in all limb leads, and these T wave inversions develop fully within two to four weeks and may persist for two to six months. Their own case, a wound of the base of the left ventricle, showed only ST elevation without T wave inversion.

In 1944 Noth[3] reviewed serial tracings of twenty-three patients with penetrating cardiac wounds. Localizing patterns were present in twelve of eighteen patients where surgery was performed and in four of the five cases in which surgery was not performed. In those cases where localizing patterns were present, deep, persistent T wave inversions in the precordial leads were the most common. Others were ST elevations in the percordial leads, and incomplete right bundle-branch block in two cases, with wounds in the right ventricle. One patient who was stabbed in the back developed the typical Q_3T_3 pattern of posterior wall damage. ST elevations and T wave inversions characteristic of pericarditis were seen in sixteen and eleven cases respectively, which without Q wave patterns made localization impossible until the evidence of pericarditis disappeared. Eleven patients were followed longer than three months. Five of the persistently abnormal cases were followed for an average of nineteen months, and six that returned to normal for an average of fourteen months. Our case has been followed for eleven months.

Caviness and Turner[4] reported a left auricle wound with six electrocardiograms showing T wave inversion in all limb leads similar to those in wounds of the right ventricle.

Cases of non-penetrating trauma[5, 6, 7] of the chest with cardiac symptoms and abnormal electrocardiographic patterns have been reported. Within the past year one of the authors (GGM) studied the electrocardiograms of two patients with such trauma which showed evidence of myocardial or pericardial injury; one of these was confirmed at autopsy. When there is non-penetrating trauma of the chest and cardiac injury is probable, serial electrocardiograms are obviously of greater diagnostic value than in surgically explored cases.

In 1943 Zerbini[8] reported the case of a boy, age six, which was the only case under twelve years of age found by the authors in the literature. He had a perforation of the right ventricle combined with an injury to the left anterior descending coronary artery.

Postoperatively he developed a pericardial effusion. Five electrocardiographic tracings, made from the 14th to the 238th day, differed relatively little from the case being reported.

Cardiac wounds may produce similar electrocardiographic patterns in both adults and children. When precordial leads are used in the serial tracings, the electrode positions should be marked on the skin with some semi-permanent dye to avoid variation in placement. It cannot be too strongly emphasized that in cases of cardiac injury, or chest trauma near the heart, serial electrocardiograms should be made, especially for diagnostic purposes in cases which do not have an immediate operation.

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Editorials

Fluorine and Arizona Teeth

There has been a considerable surge of interest in the relative amount of fluorine in community water-supplies, its effect on the dental condition, and the topical use of fluorine and other chemicals to prevent dental decay.

It seems timely to summarize the present knowledge of the subject as it concerns *Arizona*. Although the topic is ostensibly dental, it must necessarily also be medical, since it concerns body and public health. This survey was begun a year ago, and numerous articles have appeared since then in the medical and public prints. We are now able to put all the data in a good-sized capsule, with the help of such diverse sources as the J.A.M.A., the U. S. Public Health Service, Time, Life, and Collier's magazines, the University of Arizona, several dentist friends, and an occasional newspaper report.

The subject divides itself into several segments: In some areas of the United States (including Arizona) the drinking water contains *too much flourine*, and the color and contour of the teeth of the residents develop abnormally; the situation may be corrected by recognition of its cause, and by the use of other sources or removal of excess fluorine. In other areas there is *a dearth of fluorine* in the water, and the teeth are especially susceptible to decay; the deficiency can be corrected by a controlled addition of fluorides to the water-supply. Finally, the teeth of children and adults may be *treated* by a dentist or technician with a solution of fluorine or other chemicals, and receive a notable protection from the decay which is caused by several factors in the mouth.

Good general health is not regularly associated with good development and integrity of the teeth. The relative intake of carbohydrate, the climate, heredity, etcetera, are also independent. It is probable that fluorine and oxalates confer a resistance to decay. It is possible that aciduric bacilli in the mouth are an index of immunity, and that the Lactobacillus acidophilus in particular produces an acid harmful to the teeth. It is possible that these bacilli may be replaced.

The *optimal concentration* of fluorides in a domestic water supply is 1.0 part per million. A large number of tests, observations, and publications have been required to establish that fact, and to demonstrate the effects of amounts above and below that level. Community surveys (chiefly in the mid-west) and community experimentation have contributed to the solution of a problem which is not yet complete. The major point of interest is the following sequence—an optimal amount of fluorine in the water results in a high fluorine content of the tooth enamel, which in turn is accompanied by a low incidence of decay. The mechanism is still uncertain—the entrance may be through nutritive channels, especially during tooth formation, and by absorption, especially after eruption and in later years. The effects of fluorine on the physiology and bacteriology of the teeth and mouth are not surely known.

The mode by which fluorine acts may be clarified by the use of radioactive tracer substances. They are now being used to determine the sites at which fluorides are deposited, the best form of fluoride, etc.

A *high level* of fluorides in the domestic water supply (more than 1.5 parts per million) results in "endemic dental fluorosis," or *mottled enamel*. The defect is developmental, and the changes (except for the third molar) take place during the first eight years of life. The epidemiology of fluorosis has been quite well plotted during the past 20 years; it is known that the condition occurs in all but 21 states, and it has been reported in Argentina, Africa, Spain, Italy, China,

and Japan. The eastern one-third of the U. S. is mostly exempt, but reports and studies show numerous localities in Texas, Colorado, the Dakotas, Iowa, Illinois, and *Arizona* in which mottled enamel occurs.

The teeth are usually a dull chalky white, and the lesion (called "brown stain" or "stained teeth") appears as a black, brown, orange, or yellow mottling. Incisors are notably involved, the changes follow the lipline, and the teeth tend to corrode, pit, chip, and deteriorate.

The first report of mottled enamel in the U. S. was by Black and McKay of Colorado in 1916. Smith, Lantz, and Smith proved that it was due to excessive amounts of fluoride in 1931. H. V. and Margaret C. Smith of the University of Arizona College of Agriculture *correlated the occurrence of mottled enamel with the concentration of fluorides in Arizona water supplies* in 1932. They tested 110 public and 75 private water sources, and noted 45 towns and rural districts in which mottling was to be found.

The amount of fluoride determined the degree of dental change, though there was some individual variation. The range of fluorides was found to be 0. to 5.0 p.p.m.; 0. to 0.8 p.p.m. was a safe range; and mild mottling began at 0.9 p.p.m., though 1.5 p.p.m. is the usual threshold level. (These figures are revised from those obtained by the early methods of analysis).

There was no constancy in the various wells of a community; city wells were normal, but adjacent rural wells often contained high levels. There was no relationship between flow, depth, and the fluoride content. The plotting of results showed mottling to be prevalent on the west border up from Yuma, over to the Phoenix area, down to the Tucson area, and southeast to the eastern border. The cities of Yuma, Tucson, and Phoenix escaped, as did the north and northeast areas of the state.

There is no therapy for mottled enamel except prevention—a method which consists of evaluating and changing the water-supply.

A *low level* of fluorides in water-supply (0. to 0.5 p.p.m.) is remarkably correlated with the development of dental caries in residents of the area. Studies in Wisconsin and Illinois showed several times the number of cavities in the teeth of children who lived in areas with 0.1 to 0.2 p.p.m., compared with those in areas with 2.0 p.p.m. The areas in which little or no fluorides are present in domestic waters are New England, the Pacific Northwest, and cities obtaining their waters from the Great Lakes, the Ohio, Potomac, and Mississippi rivers.

There are *several ways of correcting the deficiency:*—fluorides may be added to the water to produce an optimal (1.0 p.p.m) content; they may be taken in the form of tablets; and they may be added to food. Only the use in water is practicable. The chance of overdosage, or other physiological ill-effects, is said to be unimportant.

There are at least *twelve cities which are now adding fluorine to their water,* including Midland and Grand Rapids, Michigan; Newburgh, N. Y.; Brantford, Ontario; Sheboygan, Elkhorn, Janesville, Beloit, and Madison, Wisconsin; Evanston, Illinois; Ottawa, Kansas; Marshall, Texas; and Lewiston, Idaho. The incompleteness of attempts to supply the deficiency may be gathered from the statement that there are 400 communities in Wisconsin with low natural fluoride levels. The U.S.P.H.S. and the Smiths say that there are *many Arizona water-supplies known to contain less than optimal levels.*

The technical methods for fluorination will not be mentioned here, but the process can be done simply and regularly. Equipment for handling the concentrated fluoride, and simple methods for analysis are now available. The routine for arousing a community to the need for the "experiment" has usually consisted of an analysis of the water, sponsorship of the project by an interested group, publicity by local newspapers, discussion by imported speakers, a permit by the council, and arrangements for fluorination by the health and water departments. It is interesting to note that *state dental societies have repeatedly approved of the procedure,* and in some areas have urged that deficient water be condemned.

The *treatment of teeth* to increase their resistance to decay is currently being attempted in two ways: Chemicals may be *applied to the surface* of the teeth by dentists or technicians, and chemicals may be applied in the form of *medicated dentifrices.* Teeth of any age are eligible, but therapy had best be started in childhood.

An aqueous solution of 2% sodium fluoride is applied four times during a two-weeks period at the ages of 3, 7, 10, and 13 years. The teeth must be cleaned before each series of treatments.

The theory of effect is not certain, but it is believed that the enamel or dentin becomes impregnated by the chemical, where it is either bound or absorbed; the solubility of the calcified portion is decreased; the fluoride inhibits the bacterial or enzymatic process which would dissolve the protein and calcified material; and the saliva effect is changed, as shown by the L. acidophilus count. About 40 to 50 per cent of the decay is said to be prevented.

The topical use of fluorine has been started on a large scale, following the report less than two years ago that experience on 20,000 school children had shown the method to be feasible and valuable. The 80th Congress appropriated a million dollars for a demonstration fund, and most of the states then requested the help of instructional teams from the U.S.P.H.S. By September 1948, 35 teams and units of portable equipment had been sent out to show dentists, clinics, and public health centers how to use the method.

Arizona has been visited by these groups and, as has been reported in the news columns of *Arizona Medicine*, state teams have started circuits of city and rural schools. Up until the past few months very few dentists in the state had started to use the method, and then only on a few cases. The use will doubtless increase, since dental societies have been addressed on the subject, and the demand will increase. The weekly news and fiction magazines have reported and pictured the story, and the public is becoming vaguely aware of it.

Another method of treatment, based on the same principles and proposed by an Austrian emigre named Gottlieb, is the application in quick succession of zinc chloride and potassium ferrocyanide solutions. It has received only a limited trial.

The uncontrolled use of chemicals in tooth powder is to be deplored. The procedure may be of value, but it is insufficiently tested and should not have been released commercially until the results were certain. The method was developed by Kesel and colleagues at the University of Illinois, and consists of the inclusion in a dentifrice of 5% dibasic ammonium phosphate and 3% synthetic urea. The theory: diets high in sugar result in acid-producing bacteria in the mouth; these bacteria may be replaced by ammonia-producing bacteria; the suggested chemicals assist the replacement; absence of the acid-producing bacteria is then accompanied by less decay (a decrease of 35 per cent is claimed in the preliminary report). Several companies now manufacture such products.

As can be seen, most of the prophylactic and therapeutic methods are still experimental. They do have a fairly sound background, there is a need for them, and Arizona is concerned in every approach.

Gastro Intestinal Organs

Bacon, Harry E.; and Hering, Alex. C. (Philadelphia, Pa.) 385.

Cancer of the Rectum and Pelvic Colon. J. Arkansas Med. Soc. 65:170-173 (Feb.) 1949.

"In conclusion, it is our opinion that only in a moderate proportion of cases of cancer involving the anus, rectum and sigmoid, is a colostomy required. Our approach to the surgical management of malignancy in this region may be summarized as follows:

A. All lesions of the middle and upper sigmoid are resected by immediate establishment of continuity or by the Mikulicz-Rankin exteriorization method.

B. All lesions of the lower third of the sigmoid, rectosigmoid, and ampullary portion of the rectum by an abdominoperineal proctosigmoidectory without colostomy and with preservation of the sphincter musculature.

C. All lesions of the low rectum and anal canal (6 cm.) by an abdominoperineal excision of the classical method described by Miles." (Author's Conclusions) refs.

Bernstein, William C. 386.

Malignant Lesions of the Anal Canal. Journal-Lancet 69:33-37 (Feb.) 1949.

"1. Between 3 and 5 per cent of all malignancies situated below the rectosigmoid junction have their origin in the anal canal.

"2. Cancer of the anal canal should always be kept in mind when a patient presents symptoms referable to the anal canal.

"3. Metastases from anal lesions may involve the inguinal lymphatics in addition to all other structures which are involved in any other low lying rectal lesion.

"4. Radical surgical treatment must be carried out early in cancer of the anal canal if recovery statistics are to be improved. A radical

Miles abdominoperineal operation followed by bilateral excision of the inguinal lymphatics is the treatment of choice. Conservative therapy must be limited to those patients who are not proper surgical risks and to those in whom the disease has progressed to the inoperable stage." (Author's Summary and Conclusions) refs.

Black, Charles E.; and Ogle, R. Sorensen (Lansing, Mich.) 387.

Influence of Local Acidification of Tissue Bordering Cancerous Growths; With Special Reference to the Eosinophil, the Paneth Cell and the Acidophilic Plasma Cell. Arch. Path. 46:107-118 (Aug.) 1948.

"Photomicrographs are presented showing eosinophilic cell, Paneth cell and acidophilic plasma cell reactions about carcinoma of the gastrointestinal tract. Local acidification of the tissue is found where these three groups of cells are increased, as indicated by the eosinophilic reaction of the tissue. Carcinoma cells are shown to be fragmenting and disintegrating in these acidophilic areas."

Blair, F. Lloyd (Parkersburg, W. Va.) 388.

Carcinoma of the Jejunum; Report of a Case. West Virginia M. J. 45:44-45 (Feb.) 1949.

"A case of carcinoma of the jejunum is presented. The literature is reviewed." (Author's Summary) refs.

Bowers, James M. (Seattle, Wash.) 389.

Carcinoma of Body and Tail of Pancreas: Report of 3 Cases of Cancer of the Tail. Northwest Med. 48:42-46 (Jan.) 1949.

"With review of the more important pathologic and clinical aspects of carcinoma of the body and tail of the pancreas at hand, there follows abbreviated reports of the 3 cases of primary lesions in the tail." refs.

Braastad, Frederick W.; Dockerty, Malcolm B.; and Dixon, Claude F. (Rochester, Minn.) 390.

Melano-Epithelioma of the Anus and Rectum: Report of Cases and Review of Literature. Surgery 25:82-90 (Jan.) 1949.

"Eighty-six cases of melano-epithelioma of the anus and rectum have been described in the literature up to the present writing. We have added 8 more cases, 1 of which was recently encountered by us. These lesions almost always occur in the vicinity of the dentate line, are frequently pedunculated, tend to be small, and are often covered by normal-appearing mucosa." refs.—Reprinted from Current Cancer Literature.

Harlow Brooks Memorial Navajo Clinical Conference

The Harlow Brooks Memorial Conference had its beginning when Dr. Harlow Brooks of New York came to Ganado in 1934 to hold a clinic for Indian patients at the time of the annual Chautauqua. In 1935 Dr. Brooks returned for the Chautauqua and gave two medical lectures. These were attended by Reservation doctors and a few medical men from Gallup. Plans were made at this time for an annual Clinical Conference, but on April 13, 1936, Dr. Brooks died at the Doctor's Hospital in New York.

Doctor Fred H. Albee had promised Dr. Brooks he would come to the meeting in 1936, and so it became the First Harlow Brooks Memorial Navajo Clinical Conference, with about 25 doctors in attendance. The out-of-state men included Dr. Fred H. Albee of New York, Dr. Milo Tedstom of Santa Anna, California; Dr. George A. Jenner of Milwaukee, and Dr. E. F. Boyd of Los Angeles. The conference was an invitational affair, so it was not difficult to get the top medical men of the country on the program each year. Dr. Albee attended each year up to the time of his death with the exception of the year when the International Orthopedic Association met in Paris. He was President of that Association that same year. Dr. Joseph Madison Greer and Dr. E. Payne Palmer were present at each meeting. Dr. Greer was absent during World War 2, while serving as Captain in the Navy. Dr. Palmer is the only one other than the medical members of the Ganado Mission, who has taken an active part in all the Conferences. At each of the ten conferences he has presented a paper on some of the problems related to Cancer.

It has been a source of constant wonder to see, year after year, men closing their busy offices, paying their own expenses to go to Ganado for three days of intensive study and sharing the best they have learned in professional achievement, often examining or operating on difficult cases in the Sage Memorial Hospital.

One of the most heartening things is the fact

that here are gathered men of many professional, racial and religious backgrounds, living, studying and playing together in the best of good fellowship without a single note of discord. What an example for a world torn by confusion and strife! Also inspiring is the generosity of the men who, in addition to giving their time and skill, have contributed so generously in money that there are two beautiful guest cottages and a share in the School of Nursing that will stand as monuments to their generosity for many years to come. The programs have been of the highest type and many splendid papers and talks have been presented before the meetings. The program begins at nine in the morning and ends at noon and again at two until five in the afternoon. Each person on the program is given thirty minutes for his presentation. No time is lost.

The Departments of the Ganado Mission are: Sage Memorial Hospital and The School of Nursing (Accredited), Religious Education; High School (Accredited); Cornfields Community Center; Tselani Health Center; Field Health Service. It operates its own Power Plant, Farm and Dairy, Commissary and Food Service, Telephone Service, Coal Mine, Fire Department, Steam Laundry and Refrigeration.

Dr. and Mrs. C. G. Salsbury are responsible for the success and growth of Ganado Mission and Conferences. Much good has been said of Dr. and Mrs. Salsbury—all is true, nothing more need be written. They have put their heart and soul in the success of the Mission and the Conferences. Both have been made a grand success. The Mission and the Conference in their entirety will stand as a monument to the Salsburys. "Others may come and others may go, but the reputation of good work done by Dr. and Mrs. Salsbury will live on forever."

TOPICS OF CURRENT MEDICAL INTEREST

RX, DX, AND DRS.

By Guillermo Osler, M. D.

A new step may be in the offing for THERAPY OF DIABETES. The Lilly Research Laboratories has made a new insulin which has been tried out with promising results by Kirkpatrick of the Mayo Clinic. . . . Insulin mixtures were proposed in 1937 to cut the dosage, and such methods were devised in 1942. The problems of instability and the need to mix the protamine zinc and crystalline insulins in the syringe remained. . . . The current substance, approved by Dr. Wilder of the same Clinic, is the twentieth to be tried. It is temporarily called NPH 50, is neutral in reaction, and contains a protamine zinc insulin plus a suspension of soluble (regular) insulin which is stable but capable of rapid action. . . . Tests on 20 experienced severe diabetics makes the substance look good. There was no allergy. Overdosage could be more readily detected. Usage was simple. The intermediate action was good. Extra regular insulin could be added. . . . An increase in the manufacture methods is being planned.

HELP WANTED.—If anyone knows the location of a Doctor Stephen A. Youngberry of a "Mexico Pan-American League for Medical Education," please drop a note to this column. . . He is said to have gone from California to the assistance of the recent Mexican flood victims, using equipment of a Cal Tech inventor. . . . Neither the Cal Tech man nor the Cal Med Ass'n. know of him.

Various SPACE-FILLING MATERIALS and devices have been used to follow chest surgery. Air, oil, wax, fat, muscle, packs, lucite spheres, etc., have found a place in intra-pleural, extra-pleural, and extra fascial spaces. . . . The fate or disposal of the space left by lung resection is made important by the size of the space and the effect which displacement has on lung tissue and mediastinal structures. This is especially so when there is tuberculosis of contiguous lung areas, and in neoplasm cases in which the age is advanced and the future uncertain enough to make thoracoplasty a drastic supplement to resection. . . . Grindlay, Clagett, and Bulbulian have invented a prosthesis to replace the lung. and it has been satisfactory in dogs in its revised form. It consists of a lung-shaped bag of plastic which is left in the space after pneumonectomy. Polythene has been replaced by methyl methacrylate ("lucite" or "plexiglass"), due to technical advantages. The bag is air-tight and filled with fiberglass. . . . It is a logical invention, and its development will be interesting to note.

A fine thing for physicians, and one which

would give Arizona a solid standing in the medical world, would be the formation of a MEDICAL RESEARCH ASSOCIATION for clinical research. . . . Fifteen interested physicians could organize such a group, map out twenty possible projects on a five year basis, file claim on a room in some hospital for a headquarters, and have regular meetings for progress and discussion. . . . The cost would not be great if laboratory work was excluded. An endowment of a few thousand dollars would finance a part-time secretary and statistician. . . . Such a group could be arranged in Tucson and/or Phoenix. The results could be tremendous for Arizona and medicine —and help "Arizona Medicine" too.

OZENA is a rare but unpleasant condition. Atrophic rhinitis, suppuration, crusting, and a fetid odor make it a difficult problem to live with or treat. . . . It has been found that Klebsiella is a common infecting organism, and that it yields to streptomycin (though it sometimes becomes resistant). . . . More than half of a small series has been shown by Simonton to show prolonged relief from the infection when treated with SM; the essential mucous membrane disorder was not changed.

VITAL STATISTICS from the Metropolitan Life Insurance Company show 1948 to be the healthiest year on record. Life expectancy has risen again. The mortality from tuberculosis, scarlet fever, whooping cough, diphtheria, syphilis, enteritis, appendicitis, puerperal sepsis, influenza, and pneumonia all reached new low-points. Some of these were due to chemotherapy and the antibiotics. . . . Although it was a "measles year," the rate was lower than expected. Although the number of cases of poliomyelitis (27,658) were the highest since 1916, the fatality rate was the lowest on record. . . . Homicide and suicide rates were above the war years, but less than 1946 and 1947. The rate from motor accidents decreased. . . . Cancer showed a slight rise. Diabetes and CVR rates were lower. The increase in rates of coronary disease and angina pectoris were offset by a decrease in chronic nephritis, apoplexy, and chronic heart disease.

The VERSATILITY OF PHYSICIANS is sometimes fabulous. The quality is most obvious when the person is a professor, a writer, or an editor. . . Among the current crop is W. C. ALVAREZ of the Mayo Clinic, author of many articles, several texts, and the journal "Gastroenterology." He can range up and down the intestinal tract, relating all sorts of other subjects to the part at hand, including chemotherapy, metabolism, the physiology of pain, medical history, and the use of bedpans. . . Another giant of 40 years duration is "AJAX" CARLSON of Chicago, who is equally at home in the laboratory, the classroom, the lecture platform, and the courts. His scornful remark at a graduation ceremony,—"Avocations? Hah! In all my life I never yet have had time enough for medicine!"

A man named Lilienthal of the Atomic Energy Commission has heckled U. S. physicians to study up on atomic energy as it relates to medicine—to which a busy irreverent country doctor suggests that Mr. L. take a 6-year course in medicine. . . . As a compromise here is a summary of about two dozen articles on the subject. A RADIOISOTOPE is a substance produced by bombarding the atoms of one element with particles from other atoms. If the isotope is unstable, it emits particles or rays as it "decays," and the isotope's presence and location may be noted by measuring the emanations. . . . The largest source of isotopes for use in medicine is from the neutron bombardment of elements in chainreacting piles. . . The two general uses of radioisotopes are as tracer substances and to replace or supplement x-rays and radium in the therapy of cancer and allied diseases. . . . Iodine isotopes have been used in the study of thyroid diseases; radioactive phosphorous has been used in studying breast cancers; various "tags" are being used to study growth and the absorption, conversion, assimilation, and excretion of compounds in nutrition; tagged antigens are used to study the mechanism of allergy, etc. . . . The phosphorous isotope has been tried on various types of carcinoma, Hodgkin's disease, sarcoma, mycoses, etc., but seems to be of special value in polycythemia vera and the chronic leukemias which are intractable to radiation. . . Cobalt may have a special value. . . The place of gold, sodium, manganese, calcium, silver, strontium, etc., is not yet certain. Dozens of research projects are under way, many of them subsidized by the A.T.C.

The value of "HORMONE CREAM" as a skin tonic has been controversial. A recent medical estimate has produced the following facts concerning creams which contain an estrogenic material,—The cream will have the value of any similar lubricant. It may produce a revitalizing effect on the cells of the skin provided that there is a systemic (and therefore local) deficiency of estrogen. The improvement requires 10 to 30 days of therapy. The effects are terminated when therapy is discontinued. The action is essentially local, since absorption is not enough to produce systemic effects.

Scientific literature can be, like a golf-course, trapped and bunkered and planted with all sorts of WORD-HAZARDS. . . . Some words are the invention of the author, or informalities which have become familiar to a research group. Others are chemical terms which few non-chemists would know. . . . Then there are words which we should know, which we often see and even look up in a dictionary, but which "elude and fade,

appear again unknown." Can you always recall what anamnesis, semantics and ecology mean? Does pteroylglutomic acid always mean folic acid, and tocopherol mean vitamin E?

A physician automatically notices abnormalities in the people he sees in every day life. If he is a specialist he may tend to spot his own particular kind of pathology, but he also sees the signs of faulty posture, poor vision, Parkinsonism, anemia, acromegaly, thyroid diseases, and various mental changes. . . . One not-so-obvious condition, which must be spotted by the history, could well be watched for,—the PSYCHOPATHIC PERSONALITY, or "constitutional psychopathic inferior." . . . These are sad cases, since they are congenital, intractable, and may occur in any sort of family. They are as dangerous as rattlesnakes, and the only warning they give is their pattern of behavior. . . . The individuals have explosive tempers, lie without reason, vacillate, are ambivalent and inconstant; have a basic inferiority, and feel a need to dominate. . . . They commit motiveless crimes, and usually tend to continue the general type of crime first tried, though they may progress to the most serious and repulsive types of crime. . . . Their diagnosis must be differentiated from a situational behavior problem, but an exact classification may not be easy when a schizoid or sexual perversion tendency is present. . . . A routine examination of children who err may help in case-finding. Laws should be made specifically to apply to these patients, since the only correction is permanent segregation, with no interference by soft-hearted administrators.

The remarkably protective effect of METHIONINE on the liver has been demonstrated in a series of obstetric cases at McGill. . . . Conditions which usually tend to produce lasting injury on the liver include eclamptic toxemia, infectious hepatitis, postpartum shock with the hepatorenal syndrome, erythroblastosis foetalis, etc. . . . Methionine may be given orally, in 0.5 gm. tablets or as crystals dissolved in tomato juice, to a total of 5 to 10 gm. per day; or intravenously in a 2 to 3 per cent solution, prepared by 10 gm. in 200 c.c. of distilled water and adding it to 300 c.c. of 5% glucose solution. . . . No reaction from the protein was noted.

Very little has been said in a critical way about Sister Kenny. Physicians are traditionally close-mouthed, and she is a woman. . . . It may be said that she stressed a method when a method was needed. Her "concept" of the method's action is not entirely physiologic. . . . She now seems to feel terribly persecuted, antagonistic, and waspish—which may be the unhappy fate of a prophet, or a spur which may be good for the medical profession, or both.

A few notes about GONADAL HORMONES have accumulated, — Sevringhans clarifies the carcinogen possibility; it is probable that therapeutic doses of estrogens do not initiate the growth of carcinoma, but the growth of cancerous tissue in the genitalia or breasts may be speeded by their use. (Ergo, recurrent physical examinations should be done during estrogenic therapy). Natural estrogens are less nauseating than the synthetic varieties, though Karnaky's massive doses are well-tolerated by most women after the first 24 hours. . . . Karnaky believes that uterine bleeding occurs only with a certain blood level of the estrogens; therapeutic doses below or above that level are safe. . . . Although estrogens are to be avoided in patients with a family or personal history of neoplasm, they may be of use (in a way similar to androgens) in cases of older women with breast cancer metastases. . . . The cost of synthetic estrogens is lower than that of the natural types, and the cost of androgens is lowering in the past two years.

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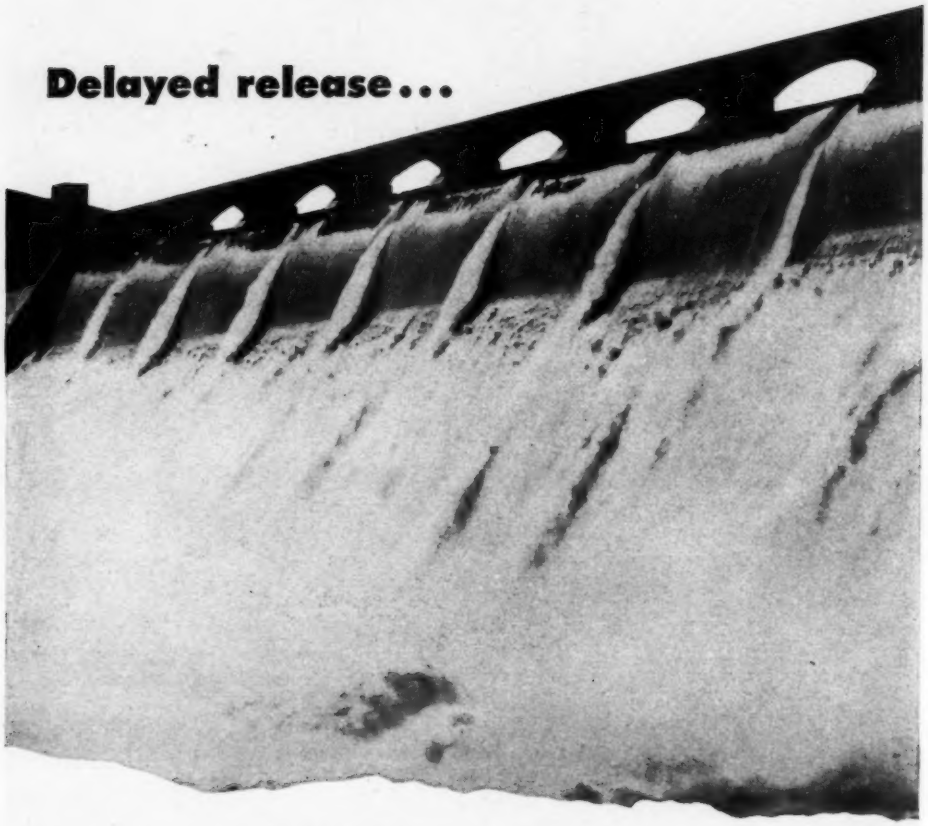

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DO DOCTORS WANT SOCIAL SECURITY?

Are you aware of the present plan of the Administration in Washington to extend Social Security? HR 2893 now before Congress would include all self-employed as farmers, doctors, lawyers, and professional people of every description. To date the farmers have raised so much objection that it seems as if they will be excluded. Here is the meaning of the bill: It will bring the self-employed into the social security taxing system. It would call for an initial tax of 2¼ per cent on income up to $4,800 for old-age insurance benefits alone. The tax on employees is expected to rise to 3 to 4½ per cent, and would be 1½ times as much for the self-employed. If you earn $4,800 or more *your tax this year* would be $108 in addition to increased income taxes.

AND—it would be almost impossible for any self-employed person to derive any benefit from old-age insurance. You could pay taxes for 40 years but at age 65 if you want to collect benefits of $25 per month, you would have to give up your business or profession to qualify. Under the present law, if you earned as much as $14.99 a month at the age of 65 you would be disqualified for old-age insurance benefits no matter how many thousands of dollars you had paid in social security taxes. It is evident that this is an attempt to bleed the self-employed in order to bail out the bankrupt social security system.

It also means the initiation of a total disability cash benefits program. This is the first step toward State Medicine and Federal Control of doctors. The State *must* control the doctors if it institutes cash benefits for disability and sickness, because the doctors are used to police the system via certification.

Our latest information is that doctors, dentists and lawyers have been excluded for the present also.

The following resolution was adopted by the House of Delegates of the American Medical Association at its Annual Session at Atlantic City June 6 to 10, 1949:

> Whereas, Extension of "Social Security" to the self-employed of the United States is under consideration by the 81st Congress; and
>
> Whereas, Provision for the exigencies of old age is an individual matter which should be left to the decision of self-employed individuals on a strictly voluntary basis; and
>
> Whereas, So-called "Social Security" is in fact a compulsory socialistic tax which has not provided satisfactory insurance protection for individuals where it has been tried but, instead, has served as the entering wedge for establishment of a socialistic form of governmental control over the lives and fortunes of the people; and
>
> Whereas, The private insurance companies of the country offer a great variety of programs which are available to individuals according to their individual requirements and desires; now, therefore, be it
>
> RESOLVED: that the House of Delegates of the American Medical Association express its disapproval of the extension of so-called "Social Security" to self-employed individuals, including physicians and surgeons.

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The control of costs is, of course, one of the major concerns of every person directly responsible for operations, production or auxiliary services in his organization. One of the important items of cost being labor, this factor receives a large amount of consideration. However, erroneous conclusions are too frequently drawn because of the tendency of many people to think in terms of the money cost per hour instead of in terms of units of goods or services produced per dollar of cost.

That the cost of labor has risen generally is usually taken for granted and the reason is widely attributed to the increase in the hourly rates paid. An examination of the rates paid the working force in the light of the current purchasing power of the dollar, however, shows most workers taking home less in terms of food, cloth-

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ing and shelter than before the war. This is in spite of the fact that earnings in money are far greater.

The obvious conclusion is that units of production per man hour are down in too many instances. This circumstance cannot be dismissed with the allegation that the average worker is lazier, less responsible or more indifferent than used to be the case. In that part of the working force where high skills and technical knowledge are required, it goes deeper than that. The cause is directly traceable to the fact that the average level of skill and trade knowledge in many skilled craft groups has been gradually slipping downward for a number of years.

Among employers of skilled craftsmen the complaint is increasingly heard that it is becoming almost impossible to find a really qualified man under the age of forty. Where this is true an investigation of the industry usually reveals that there is no generally accepted and widely practiced system of apprenticeship for the training of the workers needed for replacements and increases in demand. In these situations it is usually found that the majority of the skilled work force "picked up" enough of the skill and technical knowledge to "get by." Such a situation cannot help producing unsatisfactory results in the matter of unit cost of labor.

It is the responsibility of business and industry to train and teach the people its needs. Those individual firms and groups of firms in the same or like industries who are faced with a shortage of really qualified craftsmen in the skilled trades may obtain help in solving this problem by addressing an inquiry to John T. Douthit, Area Supervisor, Bureau of Apprenticeship, U. S. Department of Labor, 511 Heard Building Phoenix, Arizona. It is the job of this office to assist industry in planning and setting up sound, self-administered systems of apprenticeship to develop the highly skilled craftsmen needed.

A PSYCHIATRIST LOOKS AT COMPULSORY HEALTH INSURANCE

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Good health for Americans is a goal upon which agreement is general. While the physician's professional concern with this goal does not lead him to consider himself as the sole instrument for its realization, yet wisdom about it should be most available to him. Human motivations and personality will finally determine the outcome whatever the plan. No system can function at a higher level than the people who participate in it. Congress cannot legislate a result; it can only legislate a plan. Regardless of the broad humanitarian objectives of the plan, if it is not geared to the motivational factors in American behavior it will be unsuccessful.

On this premise let us examine the personality needs and motives involved in a proposal for compulsory health insurance. This can be best approached by contrasting the present with the proposed situation. The first basic change involves simple arithmetic. There are two participants in the present medical relationship, the physician and the patient; three in the proposed situation, the physician, the patient and the government agency. Psychiatric experience, psychological experimentation and common knowledge agree that the greater the number of relationships the greater the complexity of problems. A person to person relation involves one major interpersonal variable. A three person situation involves three interpersonal variables and three reactions to the interaction of the two other persons—a total of six variables. This represents a six-fold increase in complexity. When we are dealing with three groups, inter-relations of astronomical proportions develop.

Now let us contrast the probable motivations involved in the present medical situation with those in the compulsory health insurance proposal. Our present system includes primarily: (1) A patient who is attempting to regain or maintain adequate health. This patient's economic security, self-esteem and social prestige depend on a successful outcome; (2) a physician, who personally or by professional referral, is in a favorable position to help. The physician's self-esteem, economic security, social prestige and altruistic needs are directly dependent upon how adequately he can help. Thus both the

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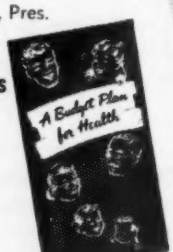

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patient's and the physician's motives converge toward the therapeutic goal. Both persons are anxious to relieve the health problem. The likelihood of favorable results is maximal.

Patients' Motivations

Contrast the present situation with the probable result of the compulsory health proposal. (1) The patient will view the physician as a public servant who has already been paid for his services and who is hence obligated to treat even a non-significant problem; (2) he will tend to feel that his deducted taxes need to be repaid in some way and will insist on being repaid. This will probably result in unnecessary calls, overly long illness disability and hostility toward the government agency and the physician when efficient termination of disability is attempted; (3) the patient is likely to develop a strong dependency relationship with extravagant expectations for help and extreme annoyance at failure. In our culture the emphasis upon self-reliance, and personal initiative makes the dangers of dependency greater than elsewhere. Dependency is generally disapproved here, and in any society results in deterioration and refusal to accept responsibility.

While the foregoing can be inferred from the motivational analysis we need not depend exclusively upon this reasoning. Experience in Great Britain, Germany, the U. S. Armed Forces and Veterans Administration demonstrate that the patients' motivations work in this fashion. These experiences demonstrate that the patient (1) makes unnecessary and picayune demands for attention; (2) has excessively long and frequent minor illnesses and disabilities; (3) becomes excessively and inappropriately critical of medical and governmental service with resultant loss of faith in the physician's ability to cure his illness.

Physicians' Motivations

Now let us examine the probable shift in the physician's motivations. Currently he is concerned with professional and therapeutic adequacy for reasons of self-esteem, social prestige, economic security and personal service. Currently he deals with a patient who attempts active cooperation for much the same reasons. The satisfaction of both persons depends upon their ability to solve the therapeutic problem. Under compulsory health insurance the physician's motivations would be shifted: (1) He will be dealing with a patient whose demands have become picayune and excessive; whose cooperation is reduced and whose hostility has increased. The physician can legitimately be expected to have less interest in the patient just because of these changes; he will also have less time for the patient's real problems. The physician may also be expected to develop a reactive hostility with a further deterioration in therapeutic adequacy; (2) supplementing the foregoing basis for "the brush-off" the physician would have an added incentive under (a) a salary system, to do as little as possible for the greatest financial return or, (b) under a per capita system, to see as many patients as minimally as possible for the maximal financial return; (3) since the physician's responsibility is no longer directly to the patient he would tend to feel less keenly than he now does the need for complete adequacy; (4) since the physician would no longer be completely responsible for the patient, but would share responsibility with a government agency his personal pride in professional excellence would tend to diminish; (5) since the incentive system to which our present generation of physicians is accustomed would be grossly changed they would be less adequately motivated; (6) an intense resentment of the noncreative possibilities of their work, the minor complaints and hostilities of their patients, the irksome dependency and submission to a government agency, and the lowering of the prestige level of the profession might be expected to develop; (7) the high type of person drawn to medicine by our present incentives of humanitarian service, social and self-esteem, and economic adequacy might no longer choose the medical profession. This change would result from the poorer quality of performance possible, the tendency of government to underpay public servants, and the lack of opportunities for personal initiative and gratification under government service. Hence the intellectual and personal qualities of newer doctors would probably be lower than the present levels.

The foregoing psychologically derived observations about physician motivations have also been demonstrated by experience. Various U. S. publicly supported and managed programs, and foreign governments with compulsory health insurance have found: (1) that the quality of medical service deteriorates; (2) that the physician substitutes for the development of clinical maturity a tendency to blame others and shift responsibil-

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ity; (3) that the physician tends to reduce his adequacy of treatment of all patients for both practical and motivational reasons; (4) that hostility toward both the government and the patient develops with a consequent loss of personal satisfaction and professional effectiveness. All of these factors are reflected in a higher cost of and lower quality of medical service.

Government Agency Motivations

The third group whose motivations complicate the compulsory health insurance picture is the administering governmental bureau. The phenomenal growth of government bureaus in the past few years, and the tendency for each to expand its activities and personnel illustrates part of the problem from this area. The sheer clerical work added to the doctor's already overloaded program would be a source of disruptive irritation. Beyond this, the desire of non-medical administrators to run things would tend to harass and antagonize physicians. This would further facilitate a deterioration in the physician's sense of responsibility and capacity for quality service. Experience with non-medical administrators of health problems has shown that their lack of capacity to understand the ramifications of the problems and their desire to usurp control leads to restrictive interfering rules and red-tape. These inevitably result in deterioration of service. At the same time the physician subjected to these controls develops some apathy about his own adequacy and permits his service to deteriorate because he is unable to do anything about it. Dependency feelings may be expected to develop in physicians under these circumstances. He is no longer a responsible, self-reliant individual because the agency shares the control of the patient.

Cost of Service

Finally the motivational problems discussed would have a direct and extreme effect upon the cost of service. With increase in patient demands, decrease in patient cooperation and deterioration of physician service we might expect a situation of rising medical costs and deteriorating medical service. The increased costs would constitute an additional motivational hazard for both physicians and patient. Both would be frustrated by the increasing discrepancy of service and cost.

This situation has also been demonstrated in countries which have adopted compulsory health insurance. In Germany between 1885 and 1939 the cost of insurance per member multiplied eight times. In New Zealand the cost has risen from less than $8 million in 1942 to $20 million in 1947. One can maintain that these increased costs are equally shared but the stated objective of compulsory health insurance is to help people avoid the disastrous economic effects of illness, not to bring equal disaster to everyone.

In summary it appears on motivational grounds that the complexity of health problems would be increased, that disabling sickness would be prolonged, that the quality of medical service would deteriorate, that personal satisfaction and clinical maturity for the physician would be reduced, and that the progress of medical science would be slowed as a result of compulsory health insurance. Whether this deteriorated and inflated medical service would become more widely available can be evaluated on similar grounds.

The foregoing contrast has somewhat overidealized our present system of medical services. That there are plenty of contemporary problems is quite apparent. These defects are now being remedied, however, by the adoption of voluntary health insurance, by improved medical education and quality of services, and a better distribution of physicians.—Rocky Mountain Medical Journal, May, 1949.

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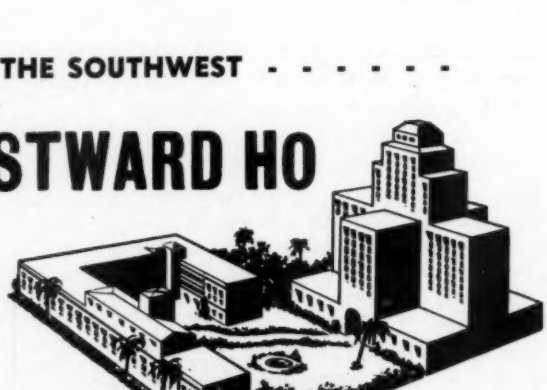

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PERSONAL NOTES

DR. CLARENCE SALSBURY, famed director of the Sage Memorial Hospital and the Ganado Mission, has announced that he will retire May 25, 1950. He has been the Navajo "Dr. Tso" ("Dr. Big") for 23 years, and has been responsible for the development of the large mission facilities, the nurses' training school for Indian women, and the yearly medical conferences. Dr. Salsbury is an associate member of the Arizona Medical Association.

The fifty leading physicians from various parts of the United States who took part in the annual **HARLOW BROOKS MEMORIAL CLINICAL CONFERENCE** have petitioned the Presbyterian board of Missions to allow Dr. Salsbury to conduct the conferences after his retirement. Dr. Salsbury has expressed his willingness if the board approves. It had been assumed that the meetings would cease when he left Ganado.

Two Phoenix physicians have discussed medical subjects in the correspondence columns of "MODERN MEDICINE." **DR. JOSEPH EHRLICH** commented on the use of quinidine, and **DR. PAUL L. SINGER** discussed an article on the Pyeloureteral Dilatation of Pregnancy.

In early August a group of citizens, called the **MOHAVE COUNTY HEALTH PROTECTIVE ASSOCIATION,** placed charges before the county supervisors concerning the hospital in Kingman. They claimed that members of the county medical society were refusing to cooperate with the county physician, and that the hospital board was remiss in not halting the conflict among physicians.

As a result the supervisors voted to replace two board members by non-Kingman residents, to bar physicians from the hospital who refuse to cooperate with other members of their profession, but they refused to discharge Mr. Joseph Coppa, manager of the hospital. Notices were sent to **DRS. FRANCIS FINDLAY, WILLIAM ORLANDO,** and **WALTER BRAZIE** banning them from the hospital.

On August 31, Superior Judge J. W. Faulkner of Kingman countermanded the major action, and ordered that the county general hospital be opened to practice to all doctors. The order followed hearing of a petition filed by the three physicians who had been barred, plus **DR. BRODA BARNES.**

DR. JAMES P. WARD of the state department of health, has announced the establishment of a division of mental hygiene. It will be federally financed. The unit will be headed by **DR. EDITH LORD,** who has recently arrived from Hawaii to start her duties. She will survey the state during the next few months, and will then conduct a program for diagnosis and therapy of emotionally maladjusted children, chiefly through community, social, and school groups. Dr. Lord has been clinical psychologist at the University of Hawaii for the past year, previous to which she taught at USC in Los Angeles, worked for the U. S. Army for two years, and instructed at the University of Houston for ten years.

DR. WARD has also announced that a statewide venereal disease program will be started, coincident with a national drive. The USPHS has sent V. V. Larson, and he will join William D. Hill of Phoenix to form a two-man team to stimulate diagnosis and reporting of VD.

The inadequacy of the public health program for control of tuberculosis was stressed by Dr. Ward in the department's yearly report. The state laboratory is cramped and insufficient for the state needs. Four counties have no public health services whatever. The four cents per capita spent on health work form one of the lowest rates in the nation. Arizona had 6,650 known tuberculous, yet there are only 90 state-supported beds to care for the disease. The one bright spot seems to be the recent installation of facilities for chest surgery in the state sanatorium. **DR. DERMONT W. MELICK** of Phoenix will do the thoracic surgery. **DR. R. A. GUTEKUNST** of Phoenix has been named as the institution's first full-time physician.

The attorney general of Arizona has intervened to prevent the **GRUNOW MEMORIAL CLINIC** from spending its accumulated funds outside of the state. The state claims that such an action is contrary to the original charitable and scientific purposes. It asks the court to appoint a receiver and later a permanent trustee.

Arizona has received 5,511 units of dried blood plasma and 4,200 units of immune serum globulin this past year from the Red Cross. The **Blood Centers** keep small amounts of immune serum globulin and albumin on hand, and they are distributed to physicians without charge. The serum albumin comes in 100 c.c. containers for use in shock, burns, hypoproteinemia, etc. The globulin comes in 2 c.c. ampoules for use in prophylaxis of measles.

The **RED CROSS BLOODMOBILE** which serves Superior will have a Spanish-speaking committee to increase the participation of individuals who are limited to that language.

DR. MICHEL PIJOAN and **DR. CHARLES S. McCAMMON** of Fort Defiance (Navajo Medical Center, United States Indian Service), have reported on "The Problem of Medical Care for Navajo Indians" in the J.A.M.A. for July 23, 1949.

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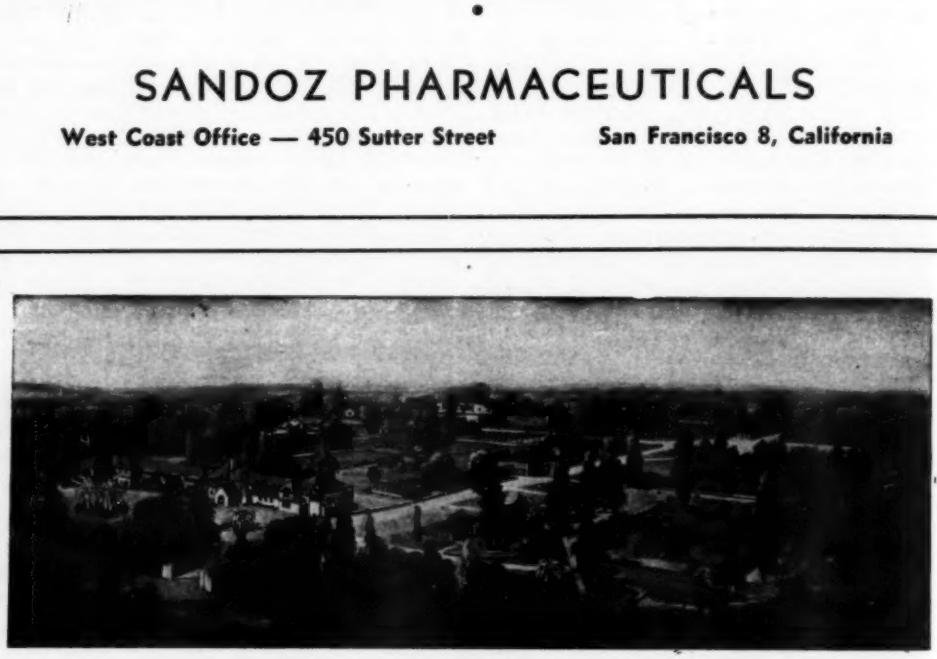

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The supervisor of Tombstone General Hospital is now **DR. BERNARD GALE,** a graduate of the College of Medical Evangelists in Los Angeles. Dr. Gale replaced **DR. L. L. OWEN,** who has taken a year's leave of absence for post-graduate work in Denver.

The hospital manager is Clark Hosley, who also acts as laboratory technician. He has announced that the hospital is gradually to undergo repairs, and that it has been recognized by the A.M.A. and the Arizona Licensing bureau.

The legality of the bond election for the proposed **SANTA CRUZ COUNTY HOSPITAL** is before the supreme court of Arizona. The board of supervisors has also gone to court in a controversy with the brokerage, which is now seeking to withdraw from its contract because of the delay.

DR. DOUGLAS D. GAIN, Phoenix, has gone to Philadelphia where, October 1st he began a nine-months Post-Graduate Course in Radiology at the Graduate Hospital. The course will be completed in June 1950.

DR. BRUCE D. HART, superintendent of the Arizona State Hospital for the Insane, has announced that three physicians have been added to the staff, bringing the total to nine. The board has requested Governor Garvey for permission to draw on the second quarter budget, since the legislature omitted salaries for the auxiliary at Florence. A request for construction of five staff cottages was also made.

Mr. Gene Doyle, chairman of the board, has asked the **AMERICAN PSYCHIATRIC ASSOCIATION** to outline a five year plan of improvement for the hospital. The objective is to have the hospital placed on the approved list of the association, which will send a team to investigate the present hospital methods.

The staff now is served the same food as the patients, and the board recently joined the medical staff and employees at a regular lunch in the hospital dining-rooms.

Army reservists from Arizona, members of the **THIRD HOSPITAL TRAIN,** attended summer training sessions at Letterman General Hospital, San Francisco. There were 19 from Phoenix, 13 from Tucson, two from Prescott, and one each from Florence and Flagstaff. Many of these are officers, and quite a few are women.

Work began in August on the $1,000,000 addition to **ST. MARY'S HOSPITAL** in Tucson. The section will be eight stories high, and will add 120 beds to the present capacity of 230 beds. The new building will become the central unit of the hospital, and the present buildings will be remodelled into rooms and wards. This will allow facilities for care of the mentally ill and contagious diseases. The construction will be highly modern, and is expected to be completed in 15 to 18 months.

DR. A. HARRY NEFFSON'S book entitled, "Acute Laryngotracheobronchitis," has just been published by Grune & Stratton.

Two cases of **BUBONIC PLAGUE,** the flea-borne "black death" of ancient Europe, have been discovered in New Mexico. Only 21 other cases have been reported in the U. S. in the past 25 years. Both cases came from contact with wild rodents, and both are responding to the new antibiotics.

GEORGE KENNEDY for the last ten years has been in the surgical and hospital business. He has been managing the Tucson branch of the Tucson Standard Surgical Supply Co., Inc. Recently appointed general manager of the Standard Surgical Supply Co., Inc. Headquarters, Phoenix.

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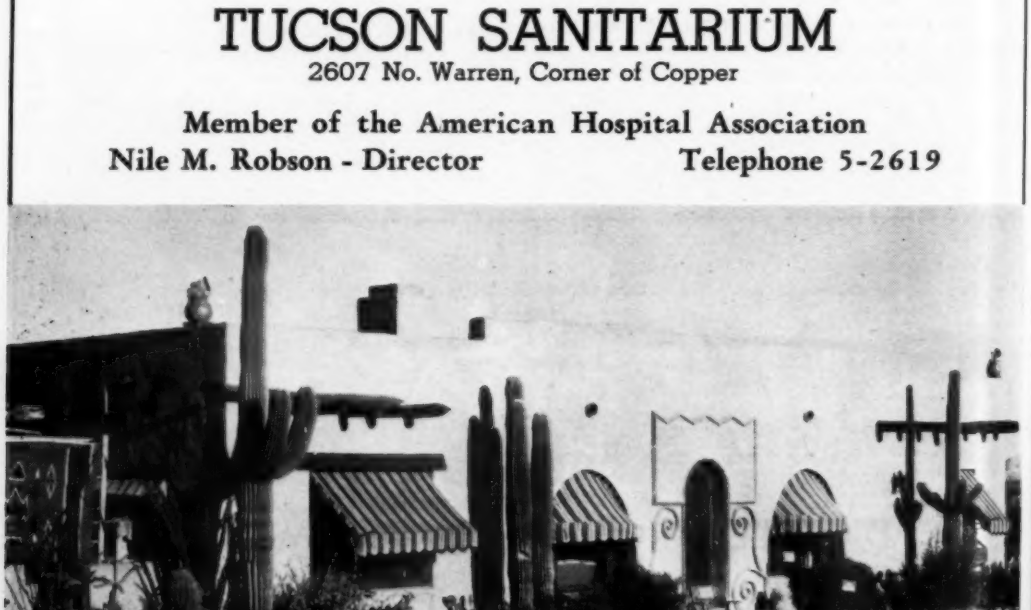

The American College of Allergists

The American College of Allergists was incorporated, without profit, in 1943. With a membership of almost 1,000, it is now the largest allergy society in the world and is also an official member of the International Association of Allergists. The College is composed entirely of Fellows of the American Medical Association, many of them holding teaching positions in the various medical schools throughout the United States. The College has Fellows and Associate Fellows; the majority of the Fellows are certified by their various specialty boards and a comparatively large number is sub-certified in Allergy. Since various clinical syndromes have been recognized during the last decade as being allergic in nature, and the vast majority of allergic diseases are now first seen and treated by the general practitioner, the College has, since its inception, inaugurated a vigorous educational program; it was the first to conduct graduate instructional courses in allergy under the auspices of various medical schools. There is always an intensive Fall course and occasionally a Spring course. These courses are honored by the Veterans Administration.

We sincerely hope that the Arizona State Medical Association will, from time to time, hold a sectional meeting on allergy at its annual meeting under the auspices of the American College of Allergists. We also urge the members of your society who are allergists to read papers before your section. The American College of Allergists is very desirous of being represented at these sectional meetings. The American College of Chest Physicians is one of the societies which is recognized by having sectional meetings with their state society. We have an authentic directory of all allergists in the United States and Canada and can furnish you at any time the names of reputable allergists in your state or adjacent states who could be invited to present some phase of allergy. We would also be very happy to collaborate with your Program Committee in suggesting outstanding men in your area who are qualified to lecture on the phases of allergy in which they are particularly interested or who are contributing to allergy literature.

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MRS. THOMAS BATE

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Mrs. Thomas Bate, who has just successfully finished the past year as President of Woman's Auxiliary to the Arizona Medical Association, now is assuming new responsibilities as Western Regional Chairman of Public Relations.

She was born and reared in Wyandotte, Michigan. Then Mrs. Bate came to Tucson and attended the University of Arizona. After her graduation she worked two summers in the Tennessee mountains doing Social Service Work, and taught school in the Grosse Point, Michigan School System for seven years.

Her husband is Dr. Thomas Bate, Surgeon of Phoenix. They have two lovely daughters, six and twelve years old.

Mrs. Bate has been active in County and State Medical Auxiliary work since 1939. She is a member of Red Cross Canteen and belongs to Red Cross Home Nursing Committee.

Dr. and Mrs. Bate were away from Phoenix for four years during his service in the war.

WHY BUY HYGEIA?

If you have ever been Hygeia chairman in your local Auxiliary you have been asked "Why should I buy Hygeia? My husband gets it for the office, but I just don't have time to read it at home." However, for the encouragement of the new Hygeia Chairmen, the majority of us Doctors' wives do subscribe to Hygeia, because we are finding out that it is the right kind of magazine to have on our family reading table; one which our teen-agers may profitably peruse and guests may pick up and find minutes of interesting reading. To quote from the annual report of the National Historian to the Woman's Auxiliary of the American Medical Association, "The promotion of Hygeia seems to have taken on added importance in the minds of many auxiliary members in its relation to health education. It is no longer regarded as an unpleasant task, as has sometimes been the case in the past, but a note of pride is detected in the general attitude concerning its distribution to the public."

By subscribing to Hygeia we also help our Auxiliary Board reach one of its goals for the year and surely this is a small reward for the effort they put forth during their term of office, and one we should cheerfully help them to win.

Let's take a look at the Magazine itself. Founded in 1923, under the auspices of the American Medical Association, its prime purpose was to reach the lay public and to present them with medical facts in a readily assimilated manner straight from accredited sources. That it has fulfilled this purpose is substantially upheld by the fact that it is being used more and more as a source book in Grade and High School, College and University physical science courses. It is also evidenced by the large number of subscriptions and renewals from those outside of the medical profession.

During the past few years Hygeia has been streamlined. It is the right size, weight and print for comfortable reading. The articles are rarely longer than a double page. They cover an amazing variety of subjects on all manner of human ailments and problems from the cradle to the grave and are written in a free, easy un-

technical style, by men and women who are authorities on their subject. There are many good illustrations and few advertisements. The price is right, too. Three dollars for a year's subscription to lay persons, half-price to professional people. Certainly a magazine well worth the small price asked.

As a public relations instrument, Hygeia is one of the best methods of getting proper medical information to the general public. When you have read your copy, pass it on to one of your friends, a neighbor or the maid. They often need the help contained in its articles more than you do with a Doctor in the family. Give a subscription to a school, a club or a library; send one to that friend who lives on a ranch or farm or in a small town. Hygeia is really appreciated in such places.

If you haven't already done so, get acquainted with Hygeia. Then renew your subscription with your Hygeia Chairman, before she asks you and be sure to pass your copy on to someone else. Who knows—it may be your bit toward helping to preserve the American way of Medicine.

Rowena A. (Mrs. George S.) Enfield,
State Hygeia Chairman.

MRS. GEORGE S. ENFIELD

Mrs. Enfield was born in Lexington, Kentucky, but at an early age became a Westerner, when the family moved to Denver, Colorado. She spent the required number of years in school, graduating from the University of Denver in 1925. For her there followed years of traveling through the Western States as her father's secretary, as secretary to the Head Nurse at St. Luke's Hospital in Denver, and as director of a Children's Party Service in The Children's Book Shop in Hollywood, California.

In 1932 she was married to Dr. George S. Enfield, of Bedford, Pa. Their two sons, Stuart, aged 16, and George, aged 11, were born in Pennsylvania.

Mrs. Enfield was President of the short-lived Bedford County Medical Auxiliary. The mountainous terrain, the inclement winter weather, and the small number of eligible members conspired against the organization. However, the members did hold two Cancer Control Forums and helped with the Crippled and Better Babies Clinics during the Auxiliary's brief existence.

The Enfield's moved to Phoenix in 1941. During the war Mrs. Enfield worked at the Blood Bank, the Servicemen's Center and on many Community Drives. She was Maricopa County Auxiliary Hygeia Chairman in 1945, the Auxiliary's President in 1946, President of Kenilworth School Parent-Teacher Association in 1948, and is now on the State Board of the Arizona Medical Auxiliary as Hygeia Chairman for 1949.

MRS. JOE C. EHRLICH

Mrs. Ehrlich was born in Chicago, Illinois; received her Ph. B. degree from the University of Chicago, majoring in Psychology, and did graduate work at the University of Chicago in the field of Social Psychiatry. She was married to Dr. Joe C. Ehrlich on November 4, 1934, residing in Chicago until Dr. Ehrlich's service in the Army took the family to the State of Washington. Mrs. Ehrlich came to Phoenix in December, 1944, where Dr. Ehrlich joined her at the close of the war.

They have two children, a son Ira aged eleven, and an eight-year-old daughter, Andrea.

Mrs. Ehrlich is active in a number of community organizations, and was Bulletin Chairman of the Maricopa County Medical Auxiliary in the past year.

THE BULLETIN

Are you a subscriber to the Bulletin of the Woman's Auxiliary to the American Medical Association? Do you know how informative and interesting a publication it is? It is extremely important that we know this publication and support it.

The Bulletin is the official publication of the

National Auxiliary. As members of the Auxiliary, we have a duty to ourselves and to the organization to subscribe to its magazine. From its pages, we can acquaint ourselves with what goes on in other state and county auxiliaries. We can profit from the other auxiliaries' methods and projects, as well as contributing to theirs. Above all, we attain a feeling of solidarity with our sister auxiliaries and the realization that as a whole we are a formidable organization that can enlighten and help the general public. As wives of physicians, we must accept this responsibility. However, in order to enlighten, we must be informed. The past few years have shown us the value of this precept. The Bulletin can keep us informed. In a more personal vein, our national publication acquaints us with the forthcoming medical conventions, and answers our questions as to reservations, program, and even the type of clothes needed. What woman does not find such information a necessity before a convention trip?

Aside from the benefits we obtain from this magazine, we have an obligation to our National Auxiliary to subscribe to its publication. This year, the Arizona State Woman's Medical Auxiliary is working towards a 100% subscription to the Bulletin from its membership. This means that we need your cooperation. Order your Bulletin at the beginning of the season in order that you do not miss a single issue. As heretofore, the cost is one dollar for four issues, published quarterly. The Bulletin Chairman of your County Auxiliary will be most anxious for your order. Those of you who are members-at-large without a County Auxiliary will find the Bulletin especially interesting, as there is no County Auxiliary to keep you informed of the organization's work and progress. You can place your order directly with the State Bulletin Chairman, Mrs. Joe C. Ehrlich, 310 West Granada Road, Phoenix, Arizona. The subscription must be prepaid.

Can we count on you?

Corienne F. (Mrs. Joe C.) Ehrlich,
State Publications. Chairman.

MRS. OTTO E. UTZINGER

Mrs. Utzinger is Second Vice-President and Program Chairman of the Woman's Auxiliary to the Arizona Medical Association. She was born and educated in Illinois and was married in St. Louis, Missouri in 1921 to Doctor Otto E. Utzinger, who is Chief Surgeon of Kennecott Copper Corporation at Ray. They have three sons: John twenty-five, William twenty-two, and David sixteen.

Mrs. Utzinger is active in many community service organizations and is Chairman of the Ray Division of the American Cancer Society. In recognition of her work in this organization, she has been named to receive the 1949 Award for Distinguished Service.

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PIMA COUNTY WOMAN'S MEDICAL AUXILIARY NEWS

Mrs. Donald Lewis, President of the Pima County Medical Auxiliary entertained the County Board Members and Committee Members at a lovely luncheon September 12th in the Fiesta Room in the Santa Rita Hotel.

Plans for the coming year were discussed with the first activity being a Rummage Sale October 1st, at 1 La Placita, West Broadway. Proceeds from this sale are to be donated to the Children's Revolving Fund sponsored by the Pima County Council of the Parent Teachers Association.

Ideas of getting acquainted with other doctors' wives were presented, and plans were made to entertain in small groups as a means of getting to know each other better.

Dr. Ralph Gamble, recently from England, is going to lecture in Tucson November 9 on the effects of Socialized Medicine in England. Mrs. Louis Hirsch, State Public Relations Chairman, and Mrs. Hervey Faris, County Public Relations Chairman are in charge of this program.

Mrs. Charles E. Starns, State President, brought back a message from The National Convention which was inspiring to the new board. Mrs. Starns stressed the necessity of getting discreet publicity, getting acquainted with Auxiliary members, the necessity of doctors' wives having outside interests, and for Auxiliaries being prepared for emergencies.

Contagious Disease Reports to State Department of Health

The Arizona Medical Association, through the Health Activities Board and the Professional Board, is urging you to increase to 100% your participation in reporting of communicable diseases.

Each week the State Department of Health sends to each doctor a post card with the list of reportable diseases. It is a simple matter to check these cards whether reportable diseases have been seen or not. This record is of vital importance statistically. Above the fact that such a report by each practicing physician is required by law is the responsibility of the practicing physician to the society around us.

The record in the state for the week ending July 30, 1949 revealed only 29% of the doctors returning these cards. The figure is consistently under 33⅓%. I am therefore asking that you be, as an individual, aware of your responsibility to your own practice and to the state community so that this figure be raised to a high level comparable to that which is only right and proper and which is attained in other areas.

J. P. Ward, M.D., M.P.H., Director,
Arizona State Health Department.

OCCURRENCE OF PEPTIC ULCER IN TWINS

The study of twins is of great value in providing information concerning the respective importance of hereditary predisposition and en-

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vironmental influences in disease in man. The results of the use of this method have shown a hereditary predisposition to tuberculosis, diabetes, and tumor formation, and a high, medium or low intelligence quotient.

There is some *a priori* evidence showing an hereditary predisposition for peptic ulcer. Only six cases of the occurrence of peptic ulcer in the one or both of mono- or dizygous twins have been reported in the readily accessible literature. Since twins are born in one of 86 births and identical twins in one of 344 births and the general incidence of ulcer is from 5 to 10 per cent, there should be plenty of material available.

I should like to ask physicians to cooperate in assemblying such material by sending me cases in which (1) one or both twins develop peptic ulcer, (2) the site of the ulcer, (3) the age of onset of ulcer, (4) the type of twins (monovular or diovular), (5) the sex of the twins, (6) the date of birth of the twins, and (7) the number and age of the brothers and sisters and the absence of ulcer in each.

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ABSTRACTS FROM LITERATURE

L. L. Klostermyer, M. D., and Paul A. Burgeson, M. D. Radiation Therapy of the Guillain-Barre Syndrome. Radiology 53: 85-87, July, 1949.

This is a short article reporting the treatment of two cases of the Guillain-Barre Syndrome by x-ray therapy as a new method of treatment and even though one case was of the chronic type which had not shown improvement for six months and presenting the picture usually associated with permanent disability and the other case was of the acute type, both responded to roentgen therapy which should encourage further trial of this type of therapy in future cases. The chronic case was a single female, twenty-three years of age and the acute case was a male two years of age. The reasoning which led to the employment of this method of treatment was the known fact that severe radicular pain is often relieved by roentgen therapy and also that x-ray in appropriate dosage stimulates phagocytosis and augments antibody production, hastening the recuperative process in many types of infection. Both of the patients reported had been followed for more than one year following the administration of treatment and no recurrence had developed.

Cushing's Disease—Pituitary Basophilism. Merrill C. Sosman, M. D. The American Journal of Roentgenology and Radium Therapy, 62: 1-32, July, 1949.

This paper is the text of the Caldwell Lecture of 1947 delivered by the author before the forty-eighth annual meeting of the American Roentgen Ray Society at Atlantic City, New Jersey in September of 1947. It has been edited before publication with the last editorial note being dated August, 1948.

Dr. Sosman has drawn on his association with Dr. Harvey Cushing and his own vast personal experience to prepare an excellent summation of our present knowledge of pituitary tumors in general and particularly pituitary basophilism or Cushing's Disease. His discussion of the pituitary adrenal mechanisms is particularly enlightening and his enumeration of the diagnostic aids available at the present time is quite clear and complete. The multitude of variations or complications of the typical Cushing's syndrome are discussed together with the pathological basis for these variations. Several interesting case reports are presented and finally a plan of treatment is evolved making use of the present day knowledge of pathology and physiology in relation to the disease and past experience with various therapeutic methods. This plan of treatment as of August, 1948 is as follows:

1. Establishment of diagnosis which can be done with a high degree of accuracy by (a) urinary hormone assays, (b) the uric acid-creatinine ratio, and (c) the adrenocorticotropic hormone test and the adrenalin test.

2. Investigation of adrenal areas to rule out adrenal tumor if this can be done.

3. Irradiation of pituitary gland.

4. If no improvement in signs, symptoms or laboratory findings in three months.

5. Irradiation to or surgical exploration of adrenal glands. If no tumor or marked hyperplasia be found:

6. Biopsy of adrenal glands followed by roentgen irradiation to both adrenal glands, following the patient's response closely with the three laboratory tests noted above.

If this order of treatment is followed out, the author states that at least half of the patients will have the signs and symptoms of the disease ameliorated and prolonged, possibly permanent remissions should be achieved in at least a third of the cases.

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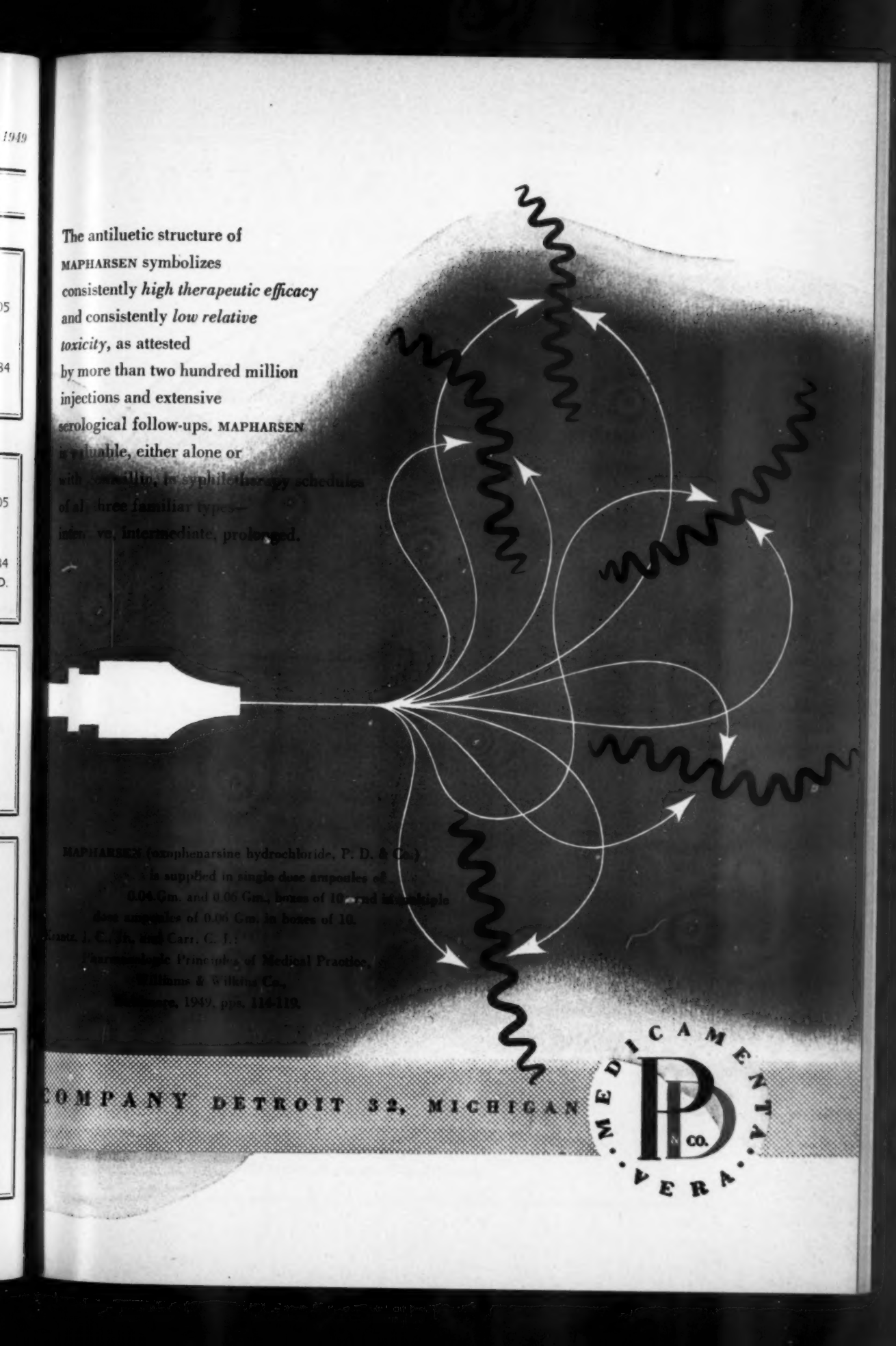
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